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References

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* AOL
http://www.aleksey.com/pipermail/xmlsec/attachments/20030729/0e25648e/attachment.htm

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1.5 libxml 2.9.10

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1.6 httpparser 2.8.1

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1.7 x-net 0.0.0-20201207224615-747e23833adb

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1.8 llvm 8.0.1

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; RUN: opt -consthoist -S -o - %s | FileCheck %s
target triple = "thumbv6m-none--musleabi"

; Check that for i8 type, the maximum legal offset is 31.
; Also check that an constant used as value to be stored rather than
; pointer in a store instruction is hoisted.
; CHECK: foo_i8
; CHECK-DAG: %[[C1:const[0-9]??]] = bitcast i32 805874720 to i32
; CHECK-DAG: %[[C2:const[0-9]??]] = bitcast i32 805874688 to i32
; CHECK-DAG: %[[C3:const[0-9]??]] = bitcast i32 805873720 to i32
define void @foo_i8() {
    entry:
    %0 = load volatile i8, i8* inttoptr (i32 805874688 to i8*)
    %1 = load volatile i8, i8* inttoptr (i32 805874692 to i8*)
    %2 = load volatile i8, i8* inttoptr (i32 805874719 to i8*)
    %3 = load volatile i8, i8* inttoptr (i32 805874720 to i8*)
    %4 = load volatile i8, i8* inttoptr (i32 805874727 to i8*)
    store i8 %4, i8* inttoptr(i32 805873688 to i8*)
    store i8 %3, i8* inttoptr(i32 805873719 to i8*)
    store i8 %2, i8* inttoptr(i32 805873720 to i8*)
    store i8 %1, i8* inttoptr(i32 805873727 to i8*)
    store i8* inttoptr(i32 805874800 to i8*), i8** @goo
    ret void
}

@goo = global i8* undef

; Check that for i16 type, the maximum legal offset is 62.
; CHECK: foo_i16
; CHECK-DAG: %[[C1:const[0-9]??]] = bitcast i32 805874752 to i32
Open Source Used In AMP for Endpoints Connector (Linux) 1.15.0 46

; CHECK-DAG: %[[C2:const[0-9]*]] = bitcast i32 805874688 to i32
; CHECK: %0 = inttopr i32 %[[C2]] to i16*
; CHECK-NEXT: %1 = load volatile i16, i16* %0, align 2
; CHECK-NEXT: %[[M1:const_mat[0-9]*]] = add i32 %[[C2]], 4
; CHECK-NEXT: %2 = inttopr i32 %[[M1]] to i16*
; CHECK-NEXT: %3 = load volatile i16, i16* %2, align 2
; CHECK-NEXT: %[[M2:const_mat[0-9]*]] = add i32 %[[C2]], 32
; CHECK-NEXT: %4 = inttopr i32 %[[M2]] to i16*
; CHECK-NEXT: %5 = load volatile i16, i16* %4, align 2
; CHECK-NEXT: %[[M3:const_mat[0-9]*]] = add i32 %[[C2]], 62
; CHECK-NEXT: %6 = inttopr i32 %[[M3]] to i16*
; CHECK-NEXT: %7 = load volatile i16, i16* %6, align 2
; CHECK-NEXT: %[[M4:const_mat[0-9]*]] = add i32 %[[C2]], 124
; CHECK-NEXT: %8 = inttopr i32 %[[M4]] to i16*
; CHECK-NEXT: %9 = load volatile i16, i16* %8, align 2
; CHECK-NEXT: %[[M5:const_mat[0-9]*]] = add i32 %[[C2]], 22
; CHECK-NEXT: %10 = inttopr i32 %[[M5]] to i16*
; CHECK-NEXT: %11 = load volatile i16, i16* %10, align 2

define void @foo_i16() {
entry:
%0 = load volatile i16, i16* inttopr (i32 805874688 to i16*), align 2
%1 = load volatile i16, i16* inttopr (i32 805874692 to i16*), align 2
%2 = load volatile i16, i16* inttopr (i32 805874720 to i16*), align 2
%3 = load volatile i16, i16* inttopr (i32 805874750 to i16*), align 2
%4 = load volatile i16, i16* inttopr (i32 805874752 to i16*), align 2
%5 = load volatile i16, i16* inttopr (i32 805874774 to i16*), align 2
ret void
}

; Check that for i32 type, the maximum legal offset is 124.
; CHECK-DAG: %[[C1:const[0-9]*]] = bitcast i32 805874816 to i32
; CHECK-DAG: %[[C2:const[0-9]*]] = bitcast i32 805874688 to i32
; CHECK: %0 = inttopr i32 %[[C2]] to i32*
; CHECK-NEXT: %1 = load volatile i32, i32* %0, align 4
; CHECK-NEXT: %[[M1:const_mat[0-9]*]] = add i32 %[[C2]], 4
; CHECK-NEXT: %2 = inttopr i32 %[[M1]] to i32*
; CHECK-NEXT: %3 = load volatile i32, i32* %2, align 4
; CHECK-NEXT: %[[M2:const_mat[0-9]*]] = add i32 %[[C2]], 124
; CHECK-NEXT: %4 = inttopr i32 %[[M2]] to i32*
; CHECK-NEXT: %5 = load volatile i32, i32* %4, align 4
; CHECK-NEXT: %[[M3:const_mat[0-9]*]] = add i32 %[[C2]], 8
; CHECK-NEXT: %6 = inttopr i32 %[[M3]] to i32*
; CHECK-NEXT: %7 = load volatile i32, i32* %6, align 4
; CHECK-NEXT: %[[M4:const_mat[0-9]*]] = add i32 %[[C2]], 12
; CHECK-NEXT: %8 = inttopr i32 %[[M4]] to i32*
define void @foo_i32() {
  entry:
  %0 = load volatile i32, i32* inttoptr (i32 805874688 to i32*), align 4
  %1 = load volatile i32, i32* inttoptr (i32 805874692 to i32*), align 4
  %2 = load volatile i32, i32* inttoptr (i32 805874812 to i32*), align 4
  %3 = load volatile i32, i32* inttoptr (i32 805874816 to i32*), align 4
  %4 = load volatile i32, i32* inttoptr (i32 805874824 to i32*), align 4
  %5 = load volatile i32, i32* inttoptr (i32 805874828 to i32*), align 4
  ret void
}

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; NOTE: Assertions have been autogenerated by utils/update_analyze_test_checks.py
; RUN: opt < %s -cost-model -analyze -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx2 | FileCheck %s --check-prefixes=CHECK,VEC256,AVX
; RUN: opt < %s -cost-model -analyze -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,+prefer-256-bit | FileCheck %s --check-prefixes=CHECK,VEC256,SKX256
; RUN: opt < %s -cost-model -analyze -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,-prefer-256-bit | FileCheck %s --check-prefixes=CHECK,VEC512

define void @zext256() "min-legal-vector-width"="256" {
  ; VEC256-LABEL: 'zext256'
  ; VEC256-NEXT: Cost Model: Found an estimated cost of 7 for instruction: %A = zext <8 x i16> undef to <8 x i64>
VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to <8 x i64>
VEC256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
VEC256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %D = zext <16 x i16> undef to <16 x i32>
VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to <32 x i16>
VEC256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void

VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x i64>
VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x i32>
VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x i32>
VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x i16>
VEC512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void

%A = zext <8 x i16> undef to <8 x i64>
%B = zext <8 x i32> undef to <8 x i64>
%C = zext <16 x i8> undef to <16 x i32>
%D = zext <16 x i16> undef to <16 x i32>
%E = zext <32 x i8> undef to <32 x i16>
ret void
}

define void @zext512() "min-legal-vector-width"="512" {
AVX-NEXT: Cost Model: Found an estimated cost of 7 for instruction: %A = zext <8 x i16> undef to <8 x i64>
AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to <8 x i64>
AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %D = zext <16 x i16> undef to <16 x i32>
AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to <32 x i16>
AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void

SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x i64>
SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x i32>

; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; SKX256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; VEC512-LABEL: 'zext512'
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; VEC512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; %A = zext <8 x i16> undef to <8 x i64>
%B = zext <8 x i32> undef to <8 x i64>
%C = zext <16 x i8> undef to <16 x i32>
%D = zext <16 x i16> undef to <16 x i32>
%E = zext <32 x i8> undef to <32 x i16>
ret void
}

define void @sext256() "min-legal-vector-width"="256" {  
; VEC256-LABEL: 'sext256'
; VEC256-NEXT: Cost Model: Found an estimated cost of 7 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; VEC256-NEXT: Cost Model: Found an estimated cost of 7 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; VEC256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; VEC256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; VEC256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; VEC512-LABEL: 'sext256'
; VEC512-NEXT: Cost Model: Found an estimated cost of 24 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
%A = sext <8 x i8> undef to <8 x i64>
%B = sext <8 x i16> undef to <8 x i64>
%C = sext <8 x i32> undef to <8 x i64>
%D = sext <16 x i8> undef to <16 x i32>
%E = sext <16 x i16> undef to <16 x i32>
%F = sext <32 x i8> undef to <32 x i16>
ret void
}
define void @sext512() "min-legal-vector-width"="512" {
; AVX-LABEL: 'sext512'
; AVX-NEXT: Cost Model: Found an estimated cost of 7 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; AVX-NEXT: Cost Model: Found an estimated cost of 7 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'sext512'
; SKX256-NEXT: Cost Model: Found an estimated cost of 24 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; SKX256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; VEC512-LABEL: 'sext512'
; VEC512-NEXT: Cost Model: Found an estimated cost of 24 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; VEC512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; %A = sext <8 x i8> undef to <8 x i64>
%B = sext <8 x i16> undef to <8 x i64>
%C = sext <8 x i32> undef to <8 x i64>
%D = sext <16 x i8> undef to <16 x i32>
%E = sext <16 x i16> undef to <16 x i32>
%F = sext <32 x i8> undef to <32 x i16>
ret void
}
; RUN: opt %s -inline -S | FileCheck %s

define internal void @innerSmall() "min-legal-vector-width"="128" {
  ret void
}

define internal void @innerLarge() "min-legal-vector-width"="512" {
  ret void
}

define internal void @innerNoAttribute() {
  ret void
}

; We should not add an attribute during inlining. No attribute means unknown.
; Inlining doesn't change the fact that we don't know anything about this
; function.
define void @outerNoAttribute() {
  call void @innerLarge()
  ret void
}

define void @outerConflictingAttributeSmall() "min-legal-vector-width"="128" {
  call void @innerLarge()
  ret void
}

define void @outerConflictingAttributeLarge() "min-legal-vector-width"="512" {
  call void @innerSmall()
  ret void
}
We should remove the attribute after inlining since the callee's vector width requirements are unknown.

define void @outerAttribute() "min-legal-vector-width"="128" {
  call void @innerNoAttribute()
  ret void
}

; CHECK: define void @outerNoAttribute() {
; CHECK: define void @outerConflictingAttributeSmall() #0
; CHECK: define void @outerConflictingAttributeLarge() #0
; CHECK: define void @outerAttribute() {
; attributes #0 = { "min-legal-vector-width"="512" }
RUN: llc -mtriple=aarch64-apple-ios %s -o - | FileCheck %s

define <16 x double> @test_sitofp_fixed(<16 x i32> %in) {
; CHECK-LABEL: test_sitofp_fixed:
  ; First, extend each i32 to i64
  ; CHECK-DAG: sshll2.2d [[BLOCK0_HI:v[0-9]+]], v0, #0
  ; CHECK-DAG: sshll2.2d [[BLOCK1_HI:v[0-9]+]], v1, #0
  ; CHECK-DAG: sshll2.2d [[BLOCK2_HI:v[0-9]+]], v2, #0
  ; CHECK-DAG: sshll2.2d [[BLOCK3_HI:v[0-9]+]], v3, #0
  ; CHECK-DAG: sshll2.2d [[BLOCK0_LO:v[0-9]+]], v0, #0
  ; CHECK-DAG: sshll2.2d [[BLOCK1_LO:v[0-9]+]], v1, #0
  ; CHECK-DAG: sshll2.2d [[BLOCK2_LO:v[0-9]+]], v2, #0
  ; CHECK-DAG: sshll2.2d [[BLOCK3_LO:v[0-9]+]], v3, #0

  ; Next, convert each to double.
  ; CHECK-DAG: scvtf.2d v0, [[BLOCK0_LO]]
  ; CHECK-DAG: scvtf.2d v1, [[BLOCK0_HI]]
  ; CHECK-DAG: scvtf.2d v2, [[BLOCK1_LO]]
  ; CHECK-DAG: scvtf.2d v3, [[BLOCK1_HI]]
  ; CHECK-DAG: scvtf.2d v4, [[BLOCK2_LO]]
  ; CHECK-DAG: scvtf.2d v5, [[BLOCK2_HI]]
  ; CHECK-DAG: scvtf.2d v6, [[BLOCK3_LO]]
  ; CHECK-DAG: scvtf.2d v7, [[BLOCK3_HI]]

  ; CHECK: ret
  %res = fdiv <16 x double> %flt, <double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0>
  ret <16 x double> %res
}

; This one is small enough to satisfy isSimple, but still illegally large.
define <4 x double> @test_sitofp_fixed_shortish(<4 x i64> %in) {
  ; CHECK-LABEL: test_sitofp_fixed_shortish:

  ; CHECK-DAG: scvtf.2d v0, v0
  ; CHECK-DAG: scvtf.2d v1, v1

  ; CHECK: ret
  %flt = sitofp <4 x i64> %in to <4 x double>
  %res = fdiv <4 x double> %flt, <double 64.0, double 64.0, double 64.0, double 64.0>
  ret <4 x double> %res
}

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; RUN: llc < %s -mtriple=x86_64-linux-android -mattr=+mmx -enable-legalize-types-checking | FileCheck %s
;
; D31946
; Check that we dont end up with the ""LLVM ERROR: Cannot select" error.
; Additionally ensure that the output code actually put fp128 values in SSE registers.

declare fp128 @llvm.fabs.f128(fp128)
declare fp128 @llvm.copysign.f128(fp128, fp128)

define fp128 @TestSelect(fp128 %a, fp128 %b) {
  %cmp = fcmp ogt fp128 %a, %b
  %sub = fsub fp128 %a, %b
  %res = select i1 %cmp, fp128 %sub, fp128 0xL00000000000000000000000000000000
  ret fp128 %res
}

; CHECK-LABEL: TestSelect:
; CHECK movaps 16(%rsp), %xmm1
; CHECK-NEXT callq __subtf3
; CHECK-NEXT testl %ebx, %ebx
; CHECK-NEXT jg .LBB0_2
; CHECK-NEXT # %bb.1:
; CHECK-NEXT movaps .LCPI0_0(%rip), %xmm0
; CHECK-NEXT .LBB0_2:
; CHECK-NEXT addq $32, %rsp
; CHECK-NEXT popq %rbx
; CHECK-NEXT retq

define fp128 @TestFabs(fp128 %a) {
  %res = call fp128 @llvm.fabs.f128(fp128 %a)
  ret fp128 %res
}

; CHECK andps .LCPI1_0(%rip), %xmm0
; CHECK-NEXT retq

define fp128 @TestCopysign(fp128 %a, fp128 %b) {
  %res = call fp128 @llvm.copysign.f128(fp128 %a, fp128 %b)
  ret fp128 %res
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APPENDIX: How to apply the Apache License to your work.

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; RUN: llvm -march=hexagon < %s
; REQUIRES: asserts

; The two loads based on %struct.0, loading two different data types
; cause LSR to assume type "void" for the memory type. This would then
; cause an assert in isLegalAddressingMode. Make sure we no longer crash.

target triple = "hexagon"

%struct.0 = type { i8*, i8, %union.anon.0 }
%union.anon.0 = type { i8* }

define hidden fastcc void @fred() unnamed_addr #0 {
  entry:
  br i1 undef, label %while.end, label %while.body.lr.ph

while.body.lr.ph: ; preds = %entry
  br label %while.body

while.body: ; preds = %exit.2, %while.body.lr.ph
  %lsr.iv = phi %struct.0* [ %cgep22, %exit.2 ], [ undef, %while.body.lr.ph ]
switch i32 undef, label %exit [ 
  i32 1, label %sw.bb.i
  i32 2, label %sw.bb3.i
] 

sw.bb.i: ; preds = %while.body
  unreachable

sw.bb3.i: ; preds = %while.body
  unreachable

exit: ; preds = %while.body
switch i32 undef, label %exit.2 [ 
  i32 1, label %sw.bb.i17
  i32 2, label %sw.bb3.i20
]

sw.bb.i17: ; preds = %.exit
  %0 = bitcast %struct.0* %lsr.iv to i32*
  %1 = load i32, i32* %0, align 4
  unreachable

sw.bb3.i20: ; preds = %exit
  %2 = bitcast %struct.0* %lsr.iv to i8**
  %3 = load i8*, i8** %2, align 4
  unreachable

exit.2: ; preds = %exit
  %cgep22 = getelementptr %struct.0, %struct.0* %lsr.iv, i32 1
  br label %while.body

while.end: ; preds = %entry
  ret void
}

attributes #0 = { nounwind optsze "target-cpu"="hexagonv55" }
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=avx512vl,avx512bw,avx512dq,prefer-256-bit |
FileCheck %s

; This file primarily contains tests for specific places in X86ISelLowering.cpp that needed be made aware of the legalizer not allowing 512-bit vectors due to prefer-256-bit even though AVX512 is enabled.

define void @add256(<16 x i32>* %a, <16 x i32>* %b, <16 x i32>* %c) "min-legal-vector-width"="256" { 
  ; CHECK-LABEL: add256:
  ; CHECK: # %bb.0:
  ; CHECK-NEXT: vmovdqa (%rdi), %ymm0
  ; CHECK-NEXT: vmovdqa 32(%rdi), %ymm1
define void @add512(<16 x i32>* %a, <16 x i32>* %b, <16 x i32>* %c) "min-legal-vector-width"="512" {
  ; CHECK-LABEL: add512:
  ; CHECK:       # %bb.0:
    ; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
    ; CHECK-NEXT:    vpaddd (%rsi), %zmm0, %zmm0
    ; CHECK-NEXT:    vpaddd 32(%rsi), %ymm1, %ymm1
    ; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
    ; CHECK-NEXT:    vzeroupper
    ; CHECK-NEXT:    retq
    %d = load <16 x i32>, <16 x i32>* %a
    %e = load <16 x i32>, <16 x i32>* %b
    %f = add <16 x i32> %d, %e
    store <16 x i32> %f, <16 x i32>* %c
    ret void
}

define void @avg_v64i8_256(<64 x i8>* %a, <64 x i8>* %b) "min-legal-vector-width"="256" {
  ; CHECK-LABEL: avg_v64i8_256:
  ; CHECK:       # %bb.0:
    ; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
    ; CHECK-NEXT:    vpaddd (%rsi), %ymm0, %ymm0
    ; CHECK-NEXT:    vpaddd 32(%rsi), %ymm1, %ymm1
    ; CHECK-NEXT:    vpavgb (%rdi), %ymm0, %ymm0
    ; CHECK-NEXT:    vpavgb 32(%rdi), %ymm1, %ymm1
    ; CHECK-NEXT:    vmovdqu %ymm1, (%rax)
    ; CHECK-NEXT:    vmovdqu %ymm0, (%rax)
    ; CHECK-NEXT:    vzeroupper
    ; CHECK-NEXT:    retq
    %1 = load <64 x i8>, <64 x i8>* %a
    %2 = load <64 x i8>, <64 x i8>* %b
    %3 = zext <64 x i8> %1 to <64 x i32>
    %4 = zext <64 x i8> %2 to <64 x i32>
    %5 = add nuw nsw <64 x i32> %3, %4
    %6 = add nuw nsw <64 x i32> %5, %4

%7 = lshr <64 x i32> %6, %3
%8 = trunc <64 x i32> %7 to <64 x i8>
store <64 x i8> %8, <64 x i8>* undef, align 4
ret void
}

define void @avg_v64i8_512(<64 x i8>* %a, <64 x i8>* %b) "min-legal-vector-width"="512" {
; CHECK-LABEL: avg_v64i8_512:
; CHECK: # %bb.0:
; CHECK-NEXT: vmovdqa64 (%rsi), %zmm0
; CHECK-NEXT: vpavgb (%rdi), %zmm0, %zmm0
; CHECK-NEXT: vmovdqu64 %zmm0, (%rax)
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%1 = load <64 x i8>, <64 x i8>* %a
%2 = load <64 x i8>, <64 x i8>* %b
%3 = zext <64 x i8> %1 to <64 x i32>
%4 = zext <64 x i8> %2 to <64 x i32>
%5 = add nuw nsw <64 x i32> %3, %4
%6 = add nuw nsw <64 x i32> %3, %4
%7 = lshr <64 x i32> %6, %3
%8 = trunc <64 x i32> %7 to <64 x i8>
store <64 x i8> %8, <64 x i8>* undef, align 4
ret void
}

define void @pmaddwd_32_256(<32 x i16>* %APtr, <32 x i16>* %BPtr, <16 x i32>* %CPtr) "min-legal-vector-width"="256" {
; CHECK-LABEL: pmaddwd_32_256:
; CHECK: # %bb.0:
; CHECK-NEXT: vmovdqa (%rdi), %ymm0
; CHECK-NEXT: vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT: vpmaddwd (%rsi), %ymm0, %ymm0
; CHECK-NEXT: vpmaddwd 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT: vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT: vmovdqa %ymm0, (%rdx)
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
define void @pmaddwd_32_512(<32 x i16>* %APtr, <32 x i16>* %BPtr, <16 x i32>* %CPtr) "min-legal-vector-width"="512" {  
; CHECK-LABEL: pmaddwd_32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:  vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:  vpmaddwd (%rsi), %zmm0, %zmm0
; CHECK-NEXT:  vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:  vzeroupper
; CHECK-NEXT:  retq
    %A = load <32 x i16>, <32 x i16>* %APtr
    %B = load <32 x i16>, <32 x i16>* %BPtr
    %a = sext <32 x i16> %A to <32 x i32>
    %b = sext <32 x i16> %B to <32 x i32>
    %m = mul nsw <32 x i32> %a, %b
    %odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32 12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
    %even = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32 13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
    %ret = add <16 x i32> %odd, %even
    store <16 x i32> %ret, <16 x i32>* %CPtr
    ret void
}

define void @psubus_64i8_max_256(<64 x i8>* %xptr, <64 x i8>* %yptr, <64 x i8>* %zptr) "min-legal-vector-width"="256" {  
; CHECK-LABEL: psubus_64i8_max_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:  vmovdqa (%rdi), %ymm0
; CHECK-NEXT:  vpsubusb (%rsi), %ymm0, %ymm0
; CHECK-NEXT:  vmovdqa %ymm0, 32(%rdx)
; CHECK-NEXT:  vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:  vzeroupper
    %A = load <32 x i16>, <32 x i16>* %APtr
    %B = load <32 x i16>, <32 x i16>* %BPtr
    %a = sext <32 x i16> %A to <32 x i32>
    %b = sext <32 x i16> %B to <32 x i32>
    %m = mul nsw <32 x i32> %a, %b
    %odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32 12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
    %even = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32 13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
    %ret = add <16 x i32> %odd, %even
    store <16 x i32> %ret, <16 x i32>* %CPtr
    ret void
}
define void @psubus_64i8_max_512(<64 x i8>* %xptr, <64 x i8>* %yptr, <64 x i8>* %zptr) "min-legal-vector-width"="512" {
  ; CHECK-LABEL: psubus_64i8_max_512:
  ; CHECK:       # %bb.0:
  ; CHECK-NEXT: vmovdqa64 (%rdi), %zmm0
  ; CHECK-NEXT: vpsubusb (%rsi), %zmm0, %zmm0
  ; CHECK-NEXT: vmovdqa64 %zmm0, (%rdx)
  ; CHECK-NEXT: vzeroupper
  ; CHECK-NEXT: retq
  %x = load <64 x i8>, <64 x i8>* %xptr
  %y = load <64 x i8>, <64 x i8>* %yptr
  %cmp = icmp ult <64 x i8> %x, %y
  %max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
  %res = sub <64 x i8> %max, %y
  store <64 x i8> %res, <64 x i8>* %zptr
  ret void
}

define i32 @_Z9test_charPcS_i_256(i8* nocapture readonly, i8* nocapture readonly, i32) "min-legal-vector-width"="256" {
  ; CHECK-LABEL: _Z9test_charPcS_i_256:
  ; CHECK:       # %bb.0: # %entry
  ; CHECK-NEXT: movl %edx, %eax
  ; CHECK-NEXT: vpxor %xmm0, %xmm0, %xmm0
  ; CHECK-NEXT: xorl %ecx, %ecx
  ; CHECK-NEXT: vpxor %xmm1, %xmm1, %xmm1
  ; CHECK-NEXT: vpxor %xmm2, %xmm2, %xmm2
  ; CHECK-NEXT: .p2align 4, 0x90
  ; CHECK-NEXT: .LBB8_1: # %vector.body
  ; CHECK-NEXT: # =>This Inner Loop Header: Depth=1
  ; CHECK-NEXT: vpmovsxbw (%rdi,%rcx), %ymm3
  ; CHECK-NEXT: vpmovsxbw 16(%rdi,%rcx), %ymm4
  ; CHECK-NEXT: vpmovsxbw (%rsi,%rcx), %ymm5
  ; CHECK-NEXT: vpmaddwd %ymm3, %ymm5, %ymm3
  ; CHECK-NEXT: vpadd %ymm1, %ymm3, %ymm1
  ; CHECK-NEXT: vpmovsxbw 16(%rsi,%rcx), %ymm3
  ; CHECK-NEXT: vpmaddwd %ymm4, %ymm3, %ymm3
  ; CHECK-NEXT: vpadd %ymm2, %ymm3, %ymm2
; CHECK-NEXT:    addq $32, %rcx
; CHECK-NEXT:    cmpq %rcx, %rax
; CHECK-NEXT:    jne .LBB8_1
; CHECK-NEXT:    # %bb.2: # %middle.block
; CHECK-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-NEXT:    vpaddd %ymm0, %ymm2, %ymm0
; CHECK-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-NEXT:    vextracti128 %1, %ymm0, %ymm1
; CHECK-NEXT:    vpaddd %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    vshufpd {{.*#+}} xmm1 = xmm0[2,3,0,1]
; CHECK-NEXT:    vpaddd %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    vpaddd %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    vmovd %ymm0, %eax
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq

entry:
%3 = zext i32 %2 to i64
br label %vector.body

vector.body:
%index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
%vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitialize, %entry ]
%4 = getelementptr inbounds i8, i8* %0, i64 %index
%5 = bitcast i8* %4 to <32 x i8>*
%wide.load = load <32 x i8>, <32 x i8>* %5, align 1
%6 = sext <32 x i8> %wide.load to <32 x i32>
%7 = getelementptr inbounds i8, i8* %1, i64 %index
%8 = bitcast i8* %7 to <32 x i8>*
%wide.load14 = load <32 x i8>, <32 x i8>* %8, align 1
%9 = sext <32 x i8> %wide.load14 to <32 x i32>
%10 = mul nsw <32 x i32> %9, %6
%11 = add nsw <32 x i32> %10, %vec.phi
%index.next = add i64 %index, 32
%12 = icmp eq i64 %index.next, %3
br i1 %12, label %middle.block, label %vector.body

middle.block:
%rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32> undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20, i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
%rdx.shuf = shufflevector <32 x i32> %bin.rdx1, <32 x i32> undef, <32 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undefined>
%bin.rdx = add <32 x i32> %bin.rdx1, %rdx.shuf
define i32 @_Z9test_charPcS_i_512(i8* nocapture readonly, i8* nocapture readonly, i32) "min-legal-vector-width"="512" {
    ; CHECK-LABEL: : _Z9test_charPcS_i_512:
    ; CHECK: # %bb.0: # %entry
    ; CHECK-NEXT: movl %edx, %eax
    ; CHECK-NEXT: vpxor %xmm0, %xmm0, %xmm0
    ; CHECK-NEXT: xorl %ecx, %ecx
    ; CHECK-NEXT: vpxor %xmm1, %xmm1, %xmm1
    ; CHECK-NEXT: .p2align 4, 0x90
    ; CHECK-NEXT: .LBB9_1: # %vector.body
    ; CHECK-NEXT: # =>This Inner Loop Header: Depth=1
    ; CHECK-NEXT: vpmovsxbw (%rdi,%rcx), %zmm2
    ; CHECK-NEXT: vpmovsxbw (%rsi,%rcx), %zmm3
    ; CHECK-NEXT: vpmaddwd %zmm2, %zmm3, %zmm2
    ; CHECK-NEXT: vpaddd %zmm1, %zmm2, %zmm1
    ; CHECK-NEXT: addq $32, %rcx
    ; CHECK-NEXT: cmpq %rcx, %rax
    ; CHECK-NEXT: jne .LBB9_1
    ; CHECK-NEXT: vpaddd %zmm0, %zmm1, %zmm0
    ; CHECK-NEXT: vextracti64x4 %zmm0, %zmm1
    ; CHECK-NEXT: vpaddd %zmm1, %zmm0, %zmm0
    ; CHECK-NEXT: vpmovsxbw (%rsi,%rcx), %zmm3
    ; CHECK-NEXT: vpmaddwd %zmm2, %zmm3, %zmm2
    ; CHECK-NEXT: vpaddd %zmm1, %zmm2, %zmm1
    ; CHECK-NEXT: addq $32, %rcx
    ; CHECK-NEXT: cmpq %rcx, %rax
    ; CHECK-NEXT: jne .LBB9_1
    ; CHECK-NEXT: # %bb.2: # %middle.block
    ; CHECK-NEXT: vpaddd %zmm0, %zmm1, %zmm0
    ; CHECK-NEXT: vextracti64x4 %zmm0, %zmm1
    ; CHECK-NEXT: vpaddd %zmm1, %zmm0, %zmm0
    ; CHECK-NEXT: vpmaddwd %zmm2, %zmm3, %zmm2
    ; CHECK-NEXT: vpaddd %zmm1, %zmm2, %zmm1
    ; CHECK-NEXT: .p2align 4, 0x90
    ; CHECK-NEXT: cmpq %rcx, %rax
    ; CHECK-NEXT: jne .LBB9_1
    ; CHECK-NEXT: vpshufd {{.*#+}} xmm1 = xmm0[2,3,0,1]
    ; CHECK-NEXT: vpadd %zmm1, %zmm0, %zmm0
    ; CHECK-NEXT: vpshufd {{.*#+}} xmm1 = xmm0[1,1,2,3]
    ; CHECK-NEXT: vpadd %zmm1, %zmm0, %zmm0
    ; CHECK-NEXT: vpaddd %zmm1, %zmm0, %zmm0
    ; CHECK-NEXT: vpaddd %zmm1, %zmm0, %zmm0
    ; CHECK-NEXT: vmovd %xmm0, %eax
}
entry:
%3 = zext i32 %2 to i64
br label %vector.body

vector.body:
%index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
%vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitializer, %entry ]
%4 = getelementptr inbounds i8, i8* %0, i64 %index
%5 = bitcast i8* %4 to <32 x i8>*
%wide.load = load <32 x i8>, <32 x i8>* %5, align 1
%6 = sext <32 x i8> %wide.load to <32 x i32>
%7 = getelementptr inbounds i8, i8* %1, i64 %index
%8 = bitcast i8* %7 to <32 x i8>*
%wide.load14 = load <32 x i8>, <32 x i8>* %8, align 1
%9 = sext <32 x i8> %wide.load14 to <32 x i32>
%10 = mul nsw <32 x i32> %9, %6
%11 = add nsw <32 x i32> <256 x i32> %10, %vec.phi
%index.next = add i64 %index, 32
%12 = icmp eq i64 %index.next, %3
br i1 %12, label %middle.block, label %vector.body

middle.block:
%rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32> undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20, i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
%rdx.shuf15 = shufflevector <32 x i32> %bin.rdx, <32 x i32> <i32 4, i32 5, i32 6, i32 7, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 unde
%bin.rdx20 = add <32 x i32> %bin.rdx18, %rdx.shuf19
%13 = extractelement <32 x i32> %bin.rdx20, i32 0
ret i32 %13
}

@a = global [1024 x i8] zeroinitializer, align 16
@b = global [1024 x i8] zeroinitializer, align 16
define i32 @sad_16i8_256() "min-legal-vector-width"="256" {
  ; CHECK-LABEL: sad_16i8_256:
  ; CHECK:       # %bb.0: # %entry
  ; CHECK-NEXT:  vxor %xmm0, %xmm0, %xmm0
  ; CHECK-NEXT:  movq $-1024, %rax # imm = 0xFC00
  ; CHECK-NEXT:  vxor %xmm1, %xmm1, %xmm1
  ; CHECK-NEXT:  .p2align 4, 0x90
  ; CHECK-NEXT:  .LBB10_1: # %vector.body
  ; CHECK-NEXT:    # ==>This Inner Loop Header: Depth=1
  ; CHECK-NEXT:    vmovdqu a+1024(%rax), %xmm2
  ; CHECK-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
  ; CHECK-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
  ; CHECK-NEXT:    addq $4, %rax
  ; CHECK-NEXT:    jne .LBB10_1
  ; CHECK-NEXT:  .LBB11_2: # %middle.block
  ; CHECK-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
  ; CHECK-NEXT:    vextracti128 $1, %ymm1, %xmm1
  ; CHECK-NEXT:    vpaddd %ymm2, %ymm2, %ymm2
  ; CHECK-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,0,1]
  ; CHECK-NEXT:    vpaddd %ymm1, %ymm0, %ymm0
  ; CHECK-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,2,3]
  ; CHECK-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
  ; CHECK-NEXT:    vzeroupper
  ; CHECK-NEXT:    retq
entry:
  br label %vector.body

vector.body:

%index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
%vec.phi = phi i16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
%0 = getelementptr inbounds [1024 x i8], [1024 x i8]* @a, i64 0, i64 %index
%1 = bitcast i8* %0 to <16 x i8>*
%2 = zext <16 x i8> %1 to <16 x i8>*
%3 = getelementptr inbounds [1024 x i8], [1024 x i8]* @b, i64 0, i64 %index
%4 = bitcast i8* %3 to <16 x i8>*
%5 = zext <16 x i8> %4 to <16 x i8>* %4, align 4
%6 = sub nsw <16 x i32> %2, %5
entry:
  br label %vector.body

vector.body:
  %index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
  %vec.phi = phi <16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
  %0 = getelementptr inbounds [1024 x i8], [1024 x i8]* @a, i64 0, i64 %index
  %1 = bitcast i8* %0 to <16 x i8>*
  %wide.load = load <16 x i8>, <16 x i8>* %1, align 4
  %2 = zext <16 x i8> %wide.load to <16 x i32>
  %3 = getelementptr inbounds [1024 x i8], [1024 x i8]* @b, i64 0, i64 %index
  %4 = bitcast i8* %3 to <16 x i8>*
  %wide.load1 = load <16 x i8>, <16 x i8>* %4, align 4
  %5 = zext <16 x i8> %wide.load1 to <16 x i32>
  %6 = sub nsw <16 x i32> %2, %5
  %7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1>
  %8 = sub nsw <16 x i32> zeroinitializer, %6
  %9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
  %10 = add nsw <16 x i32> %9, %vec.phi
  %index.next = add i64 %index, 4
  %11 = icmp eq i64 %index.next, 1024
  br i1 %11, label %middle.block, label %vector.body

middle.block:
  %.lcssa = phi <16 x i32> [ %10, %vector.body ]
  %rdx.shuf = shufflevector <16 x i32> %.lcssa, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32 13, i32 14, i32 15, i32 undef>, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
  %bin.rdx = add <16 x i32> %.lcssa, %rdx.shuf
  %rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> undef, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32 8, i32 9, i32 10, i32 11, i32 12, i32 13, i32 14, i32 15, i32 undef>, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
  %bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
  %rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> undef, <16 x i32> <i32 2, i32 3, i32 4, i32 5, i32 6, i32 7, i32 8, i32 9, i32 10, i32 11, i32 12, i32 13, i32 14, i32 15, i32 undef>, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
  %bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
  %rdx.shuf4 = shufflevector <16 x i32> %bin.rdx3, <16 x i32> undef, <16 x i32> <i32 1, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
  %bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
define void @sbtol6f32_256(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="256" {
    ; CHECK-LABEL: sbtol6f32_256:
    ; CHECK:       # %bb.0:
    ; CHECK-NEXT:    vpmovw2m %ymm0, %k0
    ; CHECK-NEXT:    kshiftrw $8, %k0, %k1
    ; CHECK-NEXT:    vpmovm2d %k1, %ymm0
    ; CHECK-NEXT:    vcvtdq2ps %ymm0, %ymm0
    ; CHECK-NEXT:    vpmovm2d %k0, %ymm1
    ; CHECK-NEXT:    vcvtdq2ps %ymm1, %ymm1
    ; CHECK-NEXT:    vmovaps %ymm1, (%rdi)
    ; CHECK-NEXT:    vzeroupper
    ; CHECK-NEXT:    retq
    %mask = icmp slt <16 x i16> %a, zeroinitialize
    %1 = sitofp <16 x i1> %mask to <16 x float>
    store <16 x float> %1, <16 x float>* %res
    ret void
}

define void @sbtol6f32_512(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="512" {
    ; CHECK-LABEL: sbtol6f32_512:
    ; CHECK:       # %bb.0:
    ; CHECK-NEXT:    vpmovw2m %ymm0, %k0
    ; CHECK-NEXT:    vpmovm2d %k0, %zmm0
    ; CHECK-NEXT:    vcvtdq2ps %zmm0, %zmm0
    ; CHECK-NEXT:    vmovaps %zmm0, (%rdi)
    ; CHECK-NEXT:    vzeroupper
    ; CHECK-NEXT:    retq
    %mask = icmp slt <16 x i16> %a, zeroinitialize
    %1 = sitofp <16 x i1> %mask to <16 x float>
    store <16 x float> %1, <16 x float>* %res
    ret void
}

define void @sbtol6f64_256(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="256" {
    ; CHECK-LABEL: sbtol6f64_256:
    ; CHECK:       # %bb.0:
    ; CHECK-NEXT:    vpmovw2m %ymm0, %k0
    ; CHECK-NEXT:    kshiftrw $8, %k0, %k1
    ; CHECK-NEXT:    vpmovm2d %k1, %ymm0
    ; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm1
    ; CHECK-NEXT:    vextracti128 $1, %ymm0, %xmm0
    ; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm0
    ; CHECK-NEXT:    vpmovm2d %k0, %ymm2

define void @sbto16f64_512(<16 x i16> %a, <16 x double>* %res)  "min-legal-vector-width"="512"  
{ CHECK-LABEL: sbto16f64_512:  
    # %bb.0:
    ; CHECK-NEXT: vpmovw2m %ymm0, %k0  
    ; CHECK-NEXT: vpmovm2d %k0, %zmm0  
    ; CHECK-NEXT: vcvtdq2pd %ymm0, %zmm1  
    ; CHECK-NEXT: vextracti64x4 $1, %zmm0, %ymm0  
    ; CHECK-NEXT: vcvtdq2pd %ymm0, %zmm0  
    ; CHECK-NEXT: vmovaps %zmm0, 64(%rdi)  
    ; CHECK-NEXT: vmovaps %zmm1, (%rdi)  
    ; CHECK-NEXT: vzeroupper  
    ; CHECK-NEXT: retq  
    %mask = icmp slt <16 x i16> %a, zeroinitializer  
    %1 = sitofp <16 x i1> %mask to <16 x double>  
    store <16 x double> %1, <16 x double>* %res  
    ret void  
}  

define void @ubto16f32_256(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="256"  
{ CHECK-LABEL: ubto16f32_256:  
    # %bb.0:
    ; CHECK-NEXT: vpmovw2m %ymm0, %k0  
    ; CHECK-NEXT: kshiftrw $8, %k0, %k1  
    ; CHECK-NEXT: vpmovm2d %k1, %ymm0  
    ; CHECK-NEXT: vpsrld $31, %ymm0, %ymm0  
    ; CHECK-NEXT: vcvtdq2ps %ymm0, %ymm0  
    ; CHECK-NEXT: vpmovm2d %k0, %ymm1  
    ; CHECK-NEXT: vpsrld $31, %ymm1, %ymm1  
    ; CHECK-NEXT: vcvtdq2ps %ymm1, %ymm1  
    ; CHECK-NEXT: vmovaps %ymm1, 32(%rdi)  
    ; CHECK-NEXT: vzeroupper  
    ; CHECK-NEXT: retq  
}
%mask = icmp slt <16 x i16> %a, zeroinitializer
%1 = uitofp <16 x i1> %mask to <16 x float>
store <16 x float> %1, <16 x float>* %res
ret void
}

define void @ubto16f32_512(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: ubto16f32_512:
; CHECK:
;     # %bb.0:
;     CHECK-NEXT: vpmovw2m %ymm0, %k0
;     CHECK-NEXT: vpmovm2d %k0, %zmm0
;     CHECK-NEXT: vpsrld $31, %zmm0, %zmm0
;     CHECK-NEXT: vcvtdq2ps %zmm0, %zmm0
;     CHECK-NEXT: vmovaps %zmm0, (%rdi)
;     CHECK-NEXT: vzeroupper
;     CHECK-NEXT: retq
%mask = icmp slt <16 x i16> %a, zeroinitializer
%1 = uitofp <16 x i1> %mask to <16 x float>
store <16 x float> %1, <16 x float>* %res
ret void
}

define void @ubto16f64_256(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f64_256:
; CHECK:
;     # %bb.0:
;     CHECK-NEXT: vpmovw2m %ymm0, %k0
;     CHECK-NEXT: kshiftrw $8, %k0, %k1
;     CHECK-NEXT: vpmovm2d %k1, %ymm0
;     CHECK-NEXT: vpsrld $31, %ymm0, %ymm0
;     CHECK-NEXT: vcvtdq2pd %xmm0, %ymm0
;     CHECK-NEXT: vextracti128 $1, %ymm0, %xmm0
;     CHECK-NEXT: vcvtdq2pd %xmm0, %ymm0
;     CHECK-NEXT: vpmovm2d %k0, %ymm2
;     CHECK-NEXT: vpsrld $31, %ymm2, %ymm2
;     CHECK-NEXT: vcvtdq2pd %xmm2, %ymm3
;     CHECK-NEXT: vextracti128 $1, %ymm2, %xmm2
;     CHECK-NEXT: vcvtdq2pd %xmm2, %ymm2
;     CHECK-NEXT: vmovaps %ymm2, 32(%rdi)
;     CHECK-NEXT: vmovaps %ymm1, 64(%rdi)
;     CHECK-NEXT: vmovaps %ymm0, 96(%rdi)
;     CHECK-NEXT: vzeroupper
;     CHECK-NEXT: retq
%mask = icmp slt <16 x i16> %a, zeroinitializer
%1 = uitofp <16 x i1> %mask to <16 x double>
store <16 x double> %1, <16 x double>* %res
ret void
}
define void @ubto16f64_512(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="512" {
    ; CHECK-LABEL: ubto16f64_512:
    ; CHECK:     # %bb.0:
    ; CHECK-NEXT: vpmovw2m %ymm0, %k0
    ; CHECK-NEXT: vpmovm2d %k0, %zmm0
    ; CHECK-NEXT: vpsrld $31, %zmm0, %zmm0
    ; CHECK-NEXT: vcvtqd2pd %ymm0, %zmm1
    ; CHECK-NEXT: vextracti64x4 $1, %zmm0, %ymm0
    ; CHECK-NEXT: vcvtqd2pd %ymm0, %zmm0
    ; CHECK-NEXT: vmovaps %zmm0, 64(%rdi)
    ; CHECK-NEXT: vmovaps %zmm1, (%rdi)
    ; CHECK-NEXT: vzeroupper
    ; CHECK-NEXT: retq

    %mask = icmp slt <16 x i16> %a, zeroinitializer
    %1 = uitofp <16 x i1> %mask to <16 x double>
    store <16 x double> %1, <16 x double>* %res
    ret void
}

define <16 x i16> @test_16f32toub_256(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-width"="256" {
    ; CHECK-LABEL: test_16f32toub_256:
    ; CHECK:     # %bb.0:
    ; CHECK-NEXT: vcvttps2dq (%rdi), %ymm1
    ; CHECK-NEXT: vpslld $31, %ymm1, %ymm1
    ; CHECK-NEXT: vpmovd2m %ymm1, %k0
    ; CHECK-NEXT: vcvtqpd <16 x i1> %k0, %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k1
    ; CHECK-NEXT: kunpckbw %k0, %k1, %k1
    ; CHECK-NEXT: vmovdqu16 %ymm0, %ymm0 {%k1} {z}
    ; CHECK-NEXT: retq

    %a = load <16 x float>, <16 x float>* %ptr
    %mask = fptoui <16 x float> %a to <16 x i1>
    %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
    ret <16 x i16> %select
}

define <16 x i16> @test_16f32toub_512(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-width"="512" {
    ; CHECK-LABEL: test_16f32toub_512:
    ; CHECK:     # %bb.0:
    ; CHECK-NEXT: vcvtqpd <16 x i1> %k0, %zmm1
    ; CHECK-NEXT: vpslld $31, %zmm1, %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k0
    ; CHECK-NEXT: vmovdqu16 %ymm0, %ymm0 {%k1} {z}
    ; CHECK-NEXT: retq
%a = load <16 x float>, <16 x float>* %ptr
%mask = fptoui <16 x float> %a to <16 x i1>
%select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_256(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-width"="256" {  
  ; CHECK-LABEL: test_16f32tosb_256:
  ; CHECK:   # %bb.0:
  ; CHECK-NEXT: vcvttps2dq (%rdi), %ymm1
  ; CHECK-NEXT: vpmovd2m %ymm1, %k0
  ; CHECK-NEXT: vcvttps2dq 32(%rdi), %ymm1
  ; CHECK-NEXT: vpmovd2m %ymm1, %k1
  ; CHECK-NEXT: kunpckbw %k0, %k1, %k1
  ; CHECK-NEXT: vmovdqu16 %ymm0, %ymm0 [%k1] [z]
  ; CHECK-NEXT: retq
  %a = load <16 x float>, <16 x float>* %ptr
  %mask = fptosi <16 x float> %a to <16 x i1>
  %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
  ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_512(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-width"="512" {  
  ; CHECK-LABEL: test_16f32tosb_512:
  ; CHECK:   # %bb.0:
  ; CHECK-NEXT: vcvttps2dq (%rdi), %zmm1
  ; CHECK-NEXT: vpmovd2m %zmm1, %k1
  ; CHECK-NEXT: vmovdqu16 %ymm0, %ymm0 [%k1] [z]
  ; CHECK-NEXT: retq
  %a = load <16 x float>, <16 x float>* %ptr
  %mask = fptosi <16 x float> %a to <16 x i1>
  %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
  ret <16 x i16> %select
}

define void @mul256(<64 x i8>* %a, <64 x i8>* %b, <64 x i8>* %c) "min-legal-vector-width"="256" {  
  ; CHECK-LABEL: mul256:
  ; CHECK:   # %bb.0:
  ; CHECK-NEXT: vmovdqa (%rdi), %ymm0
  ; CHECK-NEXT: vmovdqa 32(%rdi), %ymm1
  ; CHECK-NEXT: vmovdqa (%rsi), %ymm2
  ; CHECK-NEXT: vmovdqa 32(%rsi), %ymm3
  ; CHECK-NEXT: vpunpckhbw {{.*#}} %ymm4 =
      ymm2[8],ymm0[8],ymm2[9],ymm0[9],ymm2[10],ymm0[10],ymm2[11],ymm0[11],ymm2[12],ymm0[12],ymm2[13]
      ,ymm0[13],ymm2[14],ymm0[14],ymm2[15],ymm0[15],ymm2[24],ymm0[24],ymm2[25],ymm0[25],ymm2[26],ymm0[26],ymm2[27],ymm0[27],ymm2[28],ymm0[28],ymm2[29],ymm0[29],ymm2[30],ymm0[30],ymm2[31],ymm0[30]
; CHECK-NEXT:  vpunpckhbw {{.*#+}} ymm5 =
  ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:  vpmullw %ymm4, %ymm5, %ymm4
; CHECK-NEXT:  vmovdqa {{.*#+}} ymm5 =
; CHECK-NEXT:  vpmullw %ymm5, %ymm4, %ymm4
; CHECK-NEXT:  vpunpcklbw {{.*#+}} ymm2 =
  ymm2[0],ymm0[0],ymm2[1],ymm0[1],ymm2[2],ymm0[2],ymm2[3],ymm0[3],ymm2[4],ymm0[4],ymm2[5],ymm0[5],ymm2[6],ymm0[6],ymm2[7],ymm0[7],ymm2[16],ymm0[16],ymm2[17],ymm0[17],ymm2[28],ymm0[28],ymm2[18],ymm0[18],ymm2[19],ymm0[19],ymm2[20],ymm0[20],ymm2[21],ymm0[21],ymm2[22],ymm0[22],ymm2[23],ymm0[23]
; CHECK-NEXT:  vpunpckhbw {{.*#+}} ymm0 =
  ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:  vpmullw %ymm5, %ymm0, %ymm0
; CHECK-NEXT:  vpunpckhbw {{.*#+}} ymm4 =
  ymm1[0],ymm0[0],ymm1[1],ymm0[1],ymm1[2],ymm0[2],ymm1[3],ymm0[3],ymm1[4],ymm0[4],ymm1[5],ymm0[5],ymm1[6],ymm0[6],ymm1[7],ymm0[7],ymm1[16],ymm0[16],ymm1[17],ymm0[17],ymm1[18],ymm0[18],ymm1[19],ymm0[19],ymm1[20],ymm0[20],ymm1[21],ymm0[21],ymm1[22],ymm0[22],ymm1[23],ymm0[23]
; CHECK-NEXT:  vpmullw %ymm2, %ymm0, %ymm0
; CHECK-NEXT:  vpunpckhbw {{.*#+}} ymm3 =
  ymm3[8],ymm0[8],ymm3[9],ymm0[9],ymm3[10],ymm0[10],ymm3[11],ymm0[11],ymm3[12],ymm0[12],ymm3[13],ymm0[13],ymm3[14],ymm0[14],ymm3[15],ymm0[15],ymm3[24],ymm0[24],ymm3[25],ymm0[25],ymm3[26],ymm0[26],ymm3[27],ymm0[27],ymm3[28],ymm0[28],ymm3[29],ymm0[29],ymm3[30],ymm0[30],ymm3[31],ymm0[31]
; CHECK-NEXT:  vpmullw %ymm2, %ymm2, %ymm2
; CHECK-NEXT:  vpunpcklbw {{.*#+}} ymm2 =
  ymm2[0],ymm0[0],ymm2[1],ymm0[1],ymm2[2],ymm0[2],ymm2[3],ymm0[3],ymm2[4],ymm0[4],ymm2[5],ymm0[5],ymm2[6],ymm0[6],ymm2[7],ymm0[7],ymm2[16],ymm0[16],ymm2[17],ymm0[17],ymm2[28],ymm0[28],ymm2[18],ymm0[18],ymm2[19],ymm0[19],ymm2[20],ymm0[20],ymm2[21],ymm0[21],ymm2[22],ymm0[22],ymm2[23],ymm0[23]
; CHECK-NEXT:  vpmullw %ymm2, %ymm4, %ymm2
; CHECK-NEXT:  vpunpckhbw {{.*#+}} ymm4 =
  ymm1[8],ymm0[8],ymm1[9],ymm0[9],ymm1[10],ymm0[10],ymm1[11],ymm0[11],ymm1[12],ymm0[12],ymm1[13],ymm0[13],ymm1[14],ymm0[14],ymm1[15],ymm0[15],ymm1[24],ymm0[24],ymm1[25],ymm0[25],ymm1[26],ymm0[26],ymm1[27],ymm0[27],ymm1[28],ymm0[28],ymm1[29],ymm0[29],ymm1[30],ymm0[30],ymm1[31],ymm0[31]
; CHECK-NEXT:  vpmullw %ymm2, %ymm4, %ymm2
; CHECK-NEXT:  vpmullw %ymm5, %ymm2, %ymm2
; CHECK-NEXT:  vpunpckhbw {{.*#+}} ymm3 =
  ymm3[0],ymm0[0],ymm3[1],ymm0[1],ymm3[2],ymm0[2],ymm3[3],ymm0[3],ymm3[4],ymm0[4],ymm3[5],ymm0[5],ymm3[6],ymm0[6],ymm3[7],ymm0[7],ymm3[16],ymm0[16],ymm3[17],ymm0[17],ymm3[18],ymm0[18],ymm3[19],ymm0[19],ymm3[20],ymm0[20],ymm3[21],ymm0[21],ymm3[22],ymm0[22],ymm3[23],ymm0[23]
; CHECK-NEXT:  vpmullw %ymm3, %ymm1, %ymm1
; CHECK-NEXT:  vpmullw %ymm3, %ymm2, %ymm1
; CHECK-NEXT:  vpmullw %ymm4, %ymm1, %ymm1
; CHECK-NEXT:  vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:  vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:  vzeroupper
; CHECK-NEXT:  retq
%d = load <64 x i8>, <64 x i8>* %a
%e = load <64 x i8>, <64 x i8>* %b
%f = mul <64 x i8> %d, %e
store <64 x i8> %f, <64 x i8>* %c
ret void
define void @mul512(<64 x i8>* %a, <64 x i8>* %b, <64 x i8>* %c) "min-legal-vector-width"="512" {
  %d = load <64 x i8>, <64 x i8>* %a
  %e = load <64 x i8>, <64 x i8>* %b
  %f = mul <64 x i8> %d, %e
  store <64 x i8> %f, <64 x i8>* %c
  ret void
}

; CHECK: %d = load <64 x i8>, <64 x i8>* %a
; CHECK: %e = load <64 x i8>, <64 x i8>* %b
; CHECK: %f = mul <64 x i8> %d, %e
; CHECK: store <64 x i8> %f, <64 x i8>* %c
; CHECK: ret void

; CHECK-NEXT: vmovdqa64 (%rdi), %xmm0
; CHECK-NEXT: vmovdqa64 (%rsi), %xmm1
; CHECK-NEXT: vpunpckhbw [%.+#+] %zmm2 = %zmm1[8],%zmm0[8],%zmm1[9],%zmm0[9],%zmm1[10],%zmm0[10],%zmm1[11],%zmm0[11],%zmm1[12],%zmm0[12],%zmm1[13],%zmm0[13],%zmm1[14],%zmm0[14],%zmm1[15],%zmm0[15],%zmm1[24],%zmm0[24],%zmm1[25],%zmm0[25],%zmm1[26],%zmm0[26],%zmm1[27],%zmm0[27],%zmm1[28],%zmm0[28],%zmm1[29],%zmm0[29],%zmm1[30],%zmm0[30],%zmm1[31],%zmm0[31],%zmm1[40],%zmm0[40],%zmm1[41],%zmm0[41],%zmm1[42],%zmm0[42],%zmm1[43],%zmm0[43],%zmm1[44],%zmm0[44],%zmm1[45],%zmm0[45],%zmm1[46],%zmm0[46],%zmm1[47],%zmm0[47],%zmm1[56],%zmm0[56],%zmm1[57],%zmm0[57],%zmm1[58],%zmm0[58],%zmm1[59],%zmm0[59],%zmm1[60],%zmm0[60],%zmm1[61],%zmm0[61],%zmm1[62],%zmm0[62],%zmm1[63],%zmm0[63]
; CHECK-NEXT: vpunpckhbw [%.+#+] %zmm3 = %zmm0[8],%zmm9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,42,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-NEXT: vmovdqa64 %zmm4, %zmm0, %zmm1
; CHECK-NEXT: vpmullw %zmm2, %zmm3, %zmm2
; CHECK-NEXT: vmovdqa64 %zmm5, %zmm0, %zmm1, %zmm2
; CHECK-NEXT: vpmullw %zmm3, %zmm2, %zmm2
; CHECK-NEXT: vpand %zmm3, %zmm2, %zmm2
; CHECK-NEXT: vpunpckhbw [%.+#+] %zmm1 = %zmm0[0],%zmm0[0],%zmm1[1],%zmm0[1],%zmm1[2],%zmm0[2],%zmm1[3],%zmm0[3],%zmm1[4],%zmm0[4],%zmm1[5],%zmm0[5],%zmm1[6],%zmm0[6],%zmm1[7],%zmm0[7],%zmm1[16],%zmm0[16],%zmm1[17],%zmm0[17],%zmm1[18],%zmm0[18],%zmm1[19],%zmm0[19],%zmm1[20],%zmm0[20],%zmm1[21],%zmm0[21],%zmm1[22],%zmm0[22],%zmm1[23],%zmm0[23],%zmm1[32],%zmm0[32],%zmm1[33],%zmm0[33],%zmm1[34],%zmm0[34],%zmm1[35],%zmm0[35],%zmm1[36],%zmm0[36],%zmm1[37],%zmm0[37],%zmm1[38],%zmm0[38],%zmm1[39],%zmm0[39],%zmm1[48],%zmm0[48],%zmm1[49],%zmm0[49],%zmm1[50],%zmm0[50],%zmm1[51],%zmm0[51],%zmm1[52],%zmm0[52],%zmm1[53],%zmm0[53],%zmm1[54],%zmm0[54],%zmm1[55],%zmm0[55]
; CHECK-NEXT: vpunpckhbw [%.+#+] %zmm0 = %zmm0[0,0,1,1,2,2,3,3,3,4,4,5,5,5,6,6,6,7,7,7,16,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,23,32,33,33,33,34,34,35,35,36,36,36,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-NEXT: vpunpckhbw %zmm1, %zmm0, %zmm0
; CHECK-NEXT: vpand %zmm3, %zmm0, %zmm0
; CHECK-NEXT: vpackuswb %zmm2, %zmm0, %zmm0
; CHECK-NEXT: vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT: retq
define void @autogen_SD4739(i8*) {
    ; CHECK-NOT: Expected a GR32Bit register, but got a GRX32Bit register
    BB:
    %L34 = load i8, i8* %0
    %Cmp56 = icmp sgt i8 undef, %L34
    br label %CF246

    CF246:                                      ; preds = %CF246, %BB
    %S1163 = select i1 %Cmp56, i8 %L34, i8 undef
    br i1 undef, label %CF246, label %CF248

    CF248:                                      ; preds = %CF248, %CF246
    store i8 %S1163, i8* %0
    br label %CF248
}

1.9 clamav 0.102.4

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-- Tom St Denis
getopt.c - my re-implementation of getopt.

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libclamav/textdet.c includes modified code from file-4.23/src/ascmagic.c.

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```
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-----------------------------

Written by: Philip Hazel
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Julian Seward, Cambridge, UK.
jseward@bzip.org
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1.14 avflt 1.4

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That's all there is to it!

1.19 curl 7.72.0

1.19.1 Available under license:

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License Mixing

==============

libcurl can be built to use a fair amount of various third party libraries, libraries that are written and provided by other parties that are distributed
using their own licenses. Even libcurl itself contains code that may cause problems to some. This document attempts to describe what licenses libcurl and the other libraries use and what possible dilemmas linking and mixing them all can lead to for end users.

I am not a lawyer and this is not legal advice!

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## c-ares

(Used for asynchronous name resolves) Uses an MIT license that is very liberal and imposes no restrictions on any other library or part you may link with.

## zlib

(Used for compressed Transfer-Encoding support) Uses an MIT-style license that shouldn't collide with any other library.

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(Used for LDAP support) Uses a Modified BSD-style license. Since libcurl uses OpenLDAP as a shared library only, I have not heard of anyone that ships OpenLDAP linked with libcurl in an app.

## libssh2

(Used for scp and sftp support) libssh2 uses a Modified BSD-style license.

1.20 util-linux 2.36-r0

1.20.1 Available under license:

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Open Source Used In AMP for Endpoints Connector (Linux) 1.15.0  215
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```
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<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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1.22 sqlite 3.32.3
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1.23 clang 8.0.1

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*/

; RUN: llc -march=hexagon < %s
; REQUIRES: asserts

; The two loads based on %struct.0, loading two different data types
; cause LSR to assume type "void" for the memory type. This would then
; cause an assert in isLegalAddressingMode. Make sure we no longer crash.

target triple = "hexagon"

%struct.0 = type { i8*, i8, %union.anon.0 }
%union.anon.0 = type { i8* }

define hidden fastcc void @fred() unnamed_addr #0 {
entry:
  br i1 undef, label %while.end, label %while.body.lr.ph

while.body.lr.ph:
  ; preds = %entry
  br label %while.body

while.body:
  ; preds = %exit.2, %while.body.lr.ph
  %lsr.iv = phi %struct.0* [ %cgep22, %exit.2 ], [ undef, %while.body.lr.ph ]
  switch i32 undef, label %exit [
    i32 1, label %sw.bb.i
    i32 2, label %sw.bb3.i
  ]

sw.bb.i:
  ; preds = %while.body
  unreachable

sw.bb3.i:
  ; preds = %while.body
  unreachable

exit:
  ; preds = %while.body
  switch i32 undef, label %exit.2 [
    i32 1, label %sw.bb.i17
    i32 2, label %sw.bb3.i20
  ]

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; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --function-signature --scrub-attributes
; RUN: opt -S -passes='attributor' -aa-pipeline='basic-aa' -attributor-disable=false -attributor-max-iterations-verify -attributor-max-iterations=2 < %s FileCheck %s
; Test that we only promote arguments when the caller/callee have compatible function attributes.

target triple = "x86_64-unknown-linux-gnu"

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(8 x i64)* %arg, (8 x i64)* readonly %arg1) #0 {
  ; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512
  ; CHECK-SAME: (8 x i64)* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[ARG:%.*]], (8 x i64)* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[ARG1:%.*]])
  CHECK-NEXT: bb:
  ; CHECK-NEXT: [[TMP:%.*]] = load (8 x i64), (8 x i64)* [[ARG1]], align 32
  CHECK-NEXT: store (8 x i64) [[TMP]], (8 x i64)* [[ARG]], align 32
  CHECK-NEXT: ret void
  
  bb:
  %tmp = load (8 x i64), (8 x i64)* %arg1
  store (8 x i64) %tmp, (8 x i64)* %arg
  ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer512(8 x i64)* %arg) #0 {
  ; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
  ; CHECK-SAME: (8 x i64)* nocapture writeonly [[ARG:%.*]])
  CHECK-NEXT: bb:
  ; CHECK-NEXT: [[TMP:%.*]] = alloca (8 x i64), align 32
  CHECK-NEXT: [[TMP2:%.*]] = alloca (8 x i64), align 32
  CHECK-NEXT: [[TMP3:%.*]] = bitcast (8 x i64)* [[TMP]] to i8*
  ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* nonnull align 32 dereferenceable(64) [[TMP3]], i8 0, i64 32, i1 false)
  ; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(8 x i64)* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[TMP2]], (8 x i64)* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[TMP]]}
; CHECK-NEXT:   [[TMP4:.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
; CHECK-NEXT:   store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
; CHECK-NEXT:   ret void

bb:
%tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #1 {
  ; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256
  ; CHECK-SAME: (<8 x i64>* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[ARG:.*]], <8 x i64>* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[ARG1:.*]])
  ; CHECK-NEXT:  bb:
  ; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, <8 x i64>* [[ARG]], align 32
  ; CHECK-NEXT:    store <8 x i64> [[TMP]], <8 x i64>* [[ARG]], align 32
  ; CHECK-NEXT:    ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg) #1 {
  ; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
  ; CHECK-SAME: (<8 x i64>* nocapture writeonly [[ARG:.*]])
  ; CHECK-NEXT:  bb:
  ; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT:    [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
  ; CHECK-NEXT:    call void @llvm.memset.p0i8.i64(i8* nonnull align 32 dereferenceable(64) [[TMP3]], i8 0, i64 32, i1 false)
  ; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
  ; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* %tmp2, align 32
  ; CHECK-NEXT:    store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
  ; CHECK-NEXT:    ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg) #1 {
  ; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
  ; CHECK-SAME: (<8 x i64>* nocapture writeonly [[ARG:.*]])
  ; CHECK-NEXT:  bb:
  ; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT:    [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
  ; CHECK-NEXT:    call void @llvm.memset.p0i8.i64(i8* nonnull align 32 dereferenceable(64) [[TMP3]], i8 0, i64 32, i1 false)
  ; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
  ; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* %tmp2, align 32
  ; CHECK-NEXT:    store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
  ; CHECK-NEXT:    ret void
}
bb:
%tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #1 {
  ; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512legal512_prefer256
  ; CHECK-SAME: (<8 x i64>* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[ARG:%.*]], <8 x i64>* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[ARG1:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [[TMP:%.*]] = load <8 x i64>, <8 x i64>* [[ARG1]], align 32
  ; CHECK-NEXT: store <8 x i64> [[TMP]], <8 x i64>* [[ARG]], align 32
  ; CHECK-NEXT: ret void
  
  bb:
  %tmp = load <8 x i64>, <8 x i64>* %arg
  store <8 x i64> %tmp, <8 x i64>* %arg
  ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer256(<8 x i64>* %arg) #0 {
  ; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
  ; CHECK-SAME: (<8 x i64>* nocapture writeonly [[ARG:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
  ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* nonnull align 32 dereferenceable(64) [[TMP3]], i8 0, i64 32, i1 false)
  ; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* [[TMP2]], <8 x i64>* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[TMP2]], <8 x i64>* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[TMP]])
  ; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
  ; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
  ; CHECK-NEXT: ret void
  
  bb:
  %tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #0 {
 ; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
 ; CHECK-SAME: (<8 x i64>* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[ARG:%.*]], <8 x i64>* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[ARG1:%.*]])
 ; CHECK-NEXT: bb:
 ; CHECK-NEXT: [[TMP:%.*]] = load <8 x i64>, <8 x i64>* [[ARG1]], align 32
 ; CHECK-NEXT: store <8 x i64> [[TMP]], <8 x i64>* [[ARG]], align 32
 ; CHECK-NEXT: ret void

bb:
%tmp = load <8 x i64>, <8 x i64>* %arg
store <8 x i64> %tmp, <8 x i64>* %arg
ret void

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* %arg) #1 {
 ; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
 ; CHECK-SAME: (<8 x i64>* nocapture writeonly [[ARG:%.*]])
 ; CHECK-NEXT: bb:
 ; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
 ; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
 ; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
 ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* nonnull align 32 dereferenceable(64) [[TMP3]], i8 0, i64 32, i1 false)
 ; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[TMP2]], <8 x i64>* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[TMP]])
 ; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
 ; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
 ; CHECK-NEXT: ret void

bb:
%tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (<8 x i64>* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[ARG:%.*]], <8 x i64>* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[ARG1:%.*]])
; CHECK-NEXT: bb:
; CHECK-NEXT: [[TMP:%.*]] = load <8 x i64>, <8 x i64>* [[ARG1]], align 32
; CHECK-NEXT: store <8 x i64> [[TMP]], <8 x i64>* [[ARG]], align 32
; CHECK-NEXT: ret void
}
bb:
%tmp = load <8 x i64>, <8 x i64>* %arg1
store <8 x i64> %tmp, <8 x i64>* %arg
ret void
}

define void @avx512_legal256_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg) #2 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (<8 x i64>* nocapture writeonly [[ARG:%.*]])
; CHECK-NEXT: bb:
; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1)
; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
; CHECK-NEXT: ret void
bb:
%tmp = load <8 x i64>, <8 x i64>* %arg
%tmp2 = alloca <8 x i64>, align 32
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
;

; This should not promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #2 {
  ; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
  ; CHECK-SAME: (<8 x i64>* noalias nocapture nofreenonnull writeonlyalign 32 dereferenceable(64)
  [[ARG:%.*]], <8 x i64>* noalias nocapture nofreenonnull readonlyalign 32 dereferenceable(64) [[ARG1:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [[TMP:%.*]] = load <8 x i64>, <8 x i64>* [[ARG1]], align 32
  ; CHECK-NEXT: store <8 x i64> [[TMP]], <8 x i64>* [[ARG]], align 32
  ; CHECK-NEXT: ret void

  bb:
  %tmp = load <8 x i64>, <8 x i64>* %arg
  store <8 x i64> %tmp, <8 x i64>* %arg
  ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal256_prefer256(<8 x i64>* %arg) #1 {
  ; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
  ; CHECK-SAME: (<8 x i64>* nocapture writeonly[[ARG:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
  ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 dereferenceable(64) [[TMP3]], i8 0, i64 32, i1 false)
  ; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(<8 x i64>* noalias nocapture nofreenonnull writeonlyalign 32 dereferenceable(64) [[TMP2]], <8 x i64>* noalias nocapture nofreenonnull readonlyalign 32 dereferenceable(64) [[TMP]])
  ; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
  ; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
  ; CHECK-NEXT: ret void

  bb:
  %tmp = alloca <8 x i64>, align 32
  %tmp2 = alloca <8 x i64>, align 32
  %tmp3 = bitcast <8 x i64>* %tmp to i8*
  call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
  call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
  %tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
  store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
  ret void
}
define internal fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(\<8 x i64\>* %arg, \<8 x i64\>* randomly %arg1) #3 {
  ; CHECK-LABEL: define \([^*]+\)callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256
  ; CHECK-SAME: \(<8 x i64\>* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[ARG:\%^.*\]]\), \(<8 x i64\>* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[ARG1:\%^.*\]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: \[[TMP:%.*\]] = load \<8 x i64\>, \<8 x i64\>* [[ARG1]], align 32
  ; CHECK-NEXT: store \<8 x i64\> \[TMP\], \<8 x i64\>* [[ARG]], align 32
  ; CHECK-NEXT: ret void

bb:
  \%tmp = load \<8 x i64\>, \<8 x i64\>* %arg
  store \<8 x i64\> \%tmp, \<8 x i64\>* %arg
  ret void
}

define void @avx2_legal256_prefer256_call_avx2_legal512_prefer256(\<8 x i64\>* %arg) #4 {
  ; CHECK-LABEL: define \([^*]+\)avx2_legal256_prefer256_call_avx2_legal512_prefer256
  ; CHECK-SAME: \(<8 x i64\>* nocapture writeonly [[ARG:\%^.*\]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: \[[TMP:%.*\]] = alloca \<8 x i64\>, align 32
  ; CHECK-NEXT: \[[TMP2:%.*\]] = alloca \<8 x i64\>, align 32
  ; CHECK-NEXT: \[[TMP3:%.*\]] = bitcast \<8 x i64\>* [[TMP2]] to i8*
  ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
  ; CHECK-NEXT: call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(\<8 x i64\>* %tmp2, \<8 x i64\>* %arg)
  ; CHECK-NEXT: \[[TMP4:%.*\]] = load \<8 x i64\>, \<8 x i64\>* [[TMP2]], \<8 x i64\>* [[ARG]], align 2
  ; CHECK-NEXT: ret void

bb:
  \%tmp = alloca \<8 x i64\>, align 32
  \%tmp2 = alloca \<8 x i64\>, align 32
  \%tmp3 = bitcast \<8 x i64\>* \%tmp to i8*
  call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
  call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(\<8 x i64\>* \%tmp2, \<8 x i64\>* \%tmp)
  \%tmp4 = load \<8 x i64\>, \<8 x i64\>* \%tmp2, align 32
  store \<8 x i64\> \%tmp4, \<8 x i64\>* \%arg, align 2
  ret void
}

define internal fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(\<8 x i64\>* %arg, \<8 x i64\>* randomly %arg1) #5 {
  ; CHECK-LABEL: define \([^*]+\)callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256
  ; CHECK-SAME: \(<8 x i64\>* noalias nocapture nofree nonnull writeonly align 32 dereferenceable(64) [[ARG:\%^.*\]], \(<8 x i64\>* noalias nocapture nofree nonnull readonly align 32 dereferenceable(64) [[ARG1:\%^.*\]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: \[[TMP:%.*\]] = alloca \<8 x i64\>, align 32
  ; CHECK-NEXT: \[[TMP2:%.*\]] = alloca \<8 x i64\>, align 32
  ; CHECK-NEXT: \[[TMP3:%.*\]] = bitcast \<8 x i64\>* [[TMP2]] to i8*
  ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
  ; CHECK-NEXT: call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(\<8 x i64\>* %tmp2, \<8 x i64\>* %arg)
  ; CHECK-NEXT: \[[TMP4:%.*\]] = load \<8 x i64\>, \<8 x i64\>* [[TMP2]], \<8 x i64\>* [[ARG]], align 2
  ; CHECK-NEXT: ret void

bb:
  \%tmp = alloca \<8 x i64\>, align 32
  \%tmp2 = alloca \<8 x i64\>, align 32
  \%tmp3 = bitcast \<8 x i64\>* %tmp to i8*
  call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
  call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(\<8 x i64\>* \%tmp2, \<8 x i64\>* \%tmp)
  \%tmp4 = load \<8 x i64\>, \<8 x i64\>* \%tmp2, align 32
  store \<8 x i64\> \%tmp4, \<8 x i64\>* \%arg, align 2
  ret void
}

; This should promote
x i64>* readonly %arg1) #4 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (<8 x i64>* noalias noclone nofree nonnull writeonly align 32 dereferenceable(64)
[[ARG:%.*]], <8 x i64>* noalias noclone nofree nonnull readonly align 32 dereferenceable(64) [[ARG1:%.*]])
; CHECK-NEXT: bb:
; CHECK-NEXT: [[TMP:.]] = load <8 x i64>, <8 x i64>* [[ARG1]], align 32
; CHECK-NEXT: store <8 x i64> [[TMP]], <8 x i64>* [[ARG]], align 32
; CHECK-NEXT: ret void
;
bb:
	%tmp = load <8 x i64>, <8 x i64>* %arg1
store <8 x i64> %tmp, <8 x i64>* %arg
ret void
}

define void @avx2_legal512_prefer256_call_avx2_legal256_prefer256(<8 x i64>* %arg) #3 {
; CHECK-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (<8 x i64>* nocapture writeonly [[ARG:%.*]])
; CHECK-NEXT: bb:
; CHECK-NEXT: [[TMP:.]] = alloca <8 x i64>, align 32
; CHECK-NEXT: [[TMP2:.]] = alloca <8 x i64>, align 32
; CHECK-NEXT: [[TMP3:.]] = bitcast <8 x i64>* [[TMP]] to i8*
; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
; CHECK-NEXT: call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
; CHECK-NEXT: [[TMP4:.]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
; CHECK-NEXT: ret void
;
bb:
	%tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}

; Function Attrs: argmemonly nounwind
declare void @llvm.memset.p0i8.i64(i8* noclone writeonly, i8, i64, i1) #5

attributes #0 = { inlinehint norecursion nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-width"="512" "prefer-vector-width"="512" }
attributes #1 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-width"="512" "prefer-vector-width"="256" }
attributes #2 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-width"="256" "prefer-vector-width"="256" }
attributes #3 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="512" "prefer-vector-width"="256" }
attributes #4 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="256" "prefer-vector-width"="256" }
attributes #5 = { argmemonly nounwind }

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; RUN: llc -mtriple=aarch64-apple-ios %s -o - | FileCheck %s

define <16 x double> @test_sitofp_fixed(<16 x i32> %in) {
; CHECK-LABEL: test_sitofp_fixed:

; First, extend each i32 to i64
; CHECK-DAG: sshll2.2d [[BLOCK0_HI:v[0-9]+]], v0, #0
; CHECK-DAG: sshll2.2d [[BLOCK1_HI:v[0-9]+]], v1, #0
; CHECK-DAG: sshll2.2d [[BLOCK2_HI:v[0-9]+]], v2, #0
; CHECK-DAG: sshll2.2d [[BLOCK3_HI:v[0-9]+]], v3, #0
; CHECK-DAG: sshll.2d [[BLOCK0_LO:v[0-9]+]], v0, #0
; CHECK-DAG: sshll.2d [[BLOCK1_LO:v[0-9]+]], v1, #0
; CHECK-DAG: sshll.2d [[BLOCK2_LO:v[0-9]+]], v2, #0
; CHECK-DAG: sshll.2d [[BLOCK3_LO:v[0-9]+]], v3, #0

; Next, convert each to double.
; CHECK-DAG: scvtf.2d v0, [[BLOCK0_LO]]
; CHECK-DAG: scvtf.2d v1, [[BLOCK0_HI]]
; CHECK-DAG: scvtf.2d v2, [[BLOCK1_LO]]
; CHECK-DAG: scvtf.2d v3, [[BLOCK1_HI]]
; CHECK-DAG: scvtf.2d v4, [[BLOCK2_LO]]
; CHECK-DAG: scvtf.2d v5, [[BLOCK2_HI]]
; CHECK-DAG: scvtf.2d v6, [[BLOCK3_LO]]
; CHECK-DAG: scvtf.2d v7, [[BLOCK3_HI]]

; CHECK: ret
%flt = sitofp <16 x i32> %in to <16 x double>
%res = fdiv <16 x double> %flt, <double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0,
double 64.0>
ret <16 x double> %res
}

; This one is small enough to satisfy isSimple, but still illegally large.
define <4 x double> @test_sitofp_fixed_shortish(<4 x i64> %in) {
; CHECK-LABEL: test_sitofp_fixed_shortish:

; CHECK-DAG: scvtf.2d v0, v0
; CHECK-DAG: scvtf.2d v1, v1

; CHECK: ret
%flt = sitofp <4 x i64> %in to <4 x double>
%res = fdiv <4 x double> %flt, <double 64.0, double 64.0, double 64.0, double 64.0>
ret <4 x double> %res
}

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LLVM System Interface Library

-------------------------------------------------------------------------------
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Copyright (C) 2004 eXtensible Systems, Inc.
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --function-signature --scrub-attributes
; RUN: opt -S -argpromotion < %s | FileCheck %s
; RUN: opt -S -passes=argpromotion < %s | FileCheck %s
; Test that we only promote arguments when the caller/callee have compatible function attributes.

target triple = "x86_64-unknown-linux-gnu"

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #0 {
 ; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512
 ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
 ; CHECK-NEXT: bb:
 ; CHECK-NEXT: store <8 x i64> [[ARG1_VAL]], <8 x i64>* [[ARG]]
 ; CHECK-NEXT: ret void
 ; bb:
 %tmp = load <8 x i64>, <8 x i64>* %arg1
 store <8 x i64> %tmp, <8 x i64>* %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer512(<8 x i64>* %arg) #0 {
 ; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
 ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]])
 ; CHECK-NEXT: bb:
 ; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
 ; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
 ; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
 ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 [[TMP3]], i8 0, i64 32, i1 false)
 ; CHECK-NEXT: [[TMP_VAL:%.*]] = load <8 x i64>, <8 x i64>* [[TMP]]
 ; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(<8 x i64>* [[TMP2]], <8 x i64> [[TMP_VAL]])
 ; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
 ; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
 ; CHECK-NEXT: ret void
 ; bb:
 %tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT: bb:
; CHECK-NEXT: store <8 x i64> [[ARG1_VAL]], <8 x i64>* [[ARG]]
; CHECK-NEXT: ret void
;
bb:
%tmp = load <8 x i64>, <8 x i64>* %arg1
store <8 x i64> %tmp, <8 x i64>* %arg
ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (<8 x i64>* [[ARG:%.*]])
; CHECK-NEXT: bb:
; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 [[TMP3]], i8 0, i64 32, i1 false)
; CHECK-NEXT: [[TMP_VAL:%.*]] = load <8 x i64>, <8 x i64>* [[TMP]]
; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* [[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
; CHECK-NEXT: ret void
;
bb:
%tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(<8 x i64>* %arg,
<8 x i64>* readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT: bb:
; CHECK-NEXT: store <8 x i64> [[ARG1_VAL]], <8 x i64>* [[ARG]]
; CHECK-NEXT: ret void
;
bb:
%tmp = load <8 x i64>, <8 x i64>* %arg1
store <8 x i64> %tmp, <8 x i64>* %arg
ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer256(<8 x i64>* %arg) #0 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (<8 x i64>* [[ARG:%.*]])
; CHECK-NEXT: bb:
; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 [[TMP3]], i8 0, i64 32, i1 false)
; CHECK-NEXT: [[TMP_VAL:%.*]] = load <8 x i64>, <8 x i64>* [[TMP]]
; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(<8 x i64>* [[TMP2]], <8 x i64>* [[TMP_VAL]])
; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
; CHECK-NEXT: ret void
;
bb:
%tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* %arg,
define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* %arg) #1 {
  ; CHECK-LABEL: define ([^@]+)@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
  ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64>* [[ARG1_VAL:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: store <8 x i64>* [[ARG1_VAL]], <8 x i64>* [[ARG]]
  ; CHECK-NEXT: ret void
}

bb:
%tmp = load <8 x i64>, <8 x i64>* %arg1
store <8 x i64> %tmp, <8 x i64>* %arg
ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* %arg) #1 {
  ; CHECK-LABEL: define ([^@]+)@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
  ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64>* [[ARG1_VAL:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [%arg1] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [%arg2] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [%arg3] = bitcast <8 x i64>* [%arg1] to i8*
  ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 [%arg3], i8 0, i64 32, i1 false)
  ; CHECK-NEXT: [%arg1_val] = load <8 x i64>, <8 x i64>* [%arg1]
  ; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* [%arg2],<8 x i64>* [%arg3])
  ; CHECK-NEXT: [%arg2_val] = load <8 x i64>, <8 x i64>* [%arg2]
  ; CHECK-NEXT: store <8 x i64> %arg1, <8 x i64>* %arg, align 2
  ; CHECK-NEXT: ret void
}

bb:
%tmp = load <8 x i64>, <8 x i64>* %arg1
store <8 x i64> %tmp, <8 x i64>* %arg
ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* %arg) #1 {
  ; CHECK-LABEL: define ([^@]+)@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
  ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64>* [[ARG1_VAL:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [%arg1] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [%arg2] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [%arg3] = bitcast <8 x i64>* [%arg1] to i8*
  ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 [%arg3], i8 0, i64 32, i1 false)
  ; CHECK-NEXT: [%arg1_val] = load <8 x i64>, <8 x i64>* [%arg1]
  ; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(<8 x i64>* [%arg2],<8 x i64>* [%arg3])
  ; CHECK-NEXT: [%arg2_val] = load <8 x i64>, <8 x i64>* [%arg2]
  ; CHECK-NEXT: store <8 x i64> %arg1, <8 x i64>* %arg, align 2
  ; CHECK-NEXT: ret void
}

bb:
%tmp = load <8 x i64>, <8 x i64>* %arg1
store <8 x i64> %tmp, <8 x i64>* %arg
ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg, <8 x i64>* %arg1) #1 {
  ; CHECK-LABEL: define ([^@]+)@callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
  ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64>* readonly [[ARG1:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [%arg1] = load <8 x i64>, <8 x i64>* [[ARG1]]
  ; CHECK-NEXT: store <8 x i64> [[TMP]], <8 x i64>* [[ARG]]
; CHECK-NEXT: ret void
;
bb:
%tmp = load <8 x i64>, <8 x i64>* %arg1
store <8 x i64> %tmp, <8 x i64>* %arg
ret void
}

define void @avx512_legal256_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %arg) #2 {
  ; CHECK-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
  ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
  ; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
  ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 [[TMP3]], i8 0, i64 32, i1 false)
  ; CHECK-NEXT: call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(<8 x i64>* [[TMP2]], <8 x i64>* [[TMP]])
  ; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
  ; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
  ; CHECK-NEXT: ret void

; This should not promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #2 {
  ; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
  ; CHECK-SAME: (<8 x i64>* readonly [[ARG:%.*]], <8 x i64>* readonly [[ARG1:%.*]])
  ; CHECK-NEXT: bb:
  ; CHECK-NEXT: [[TMP:%.*]] = load <8 x i64>, <8 x i64>* [[ARG1]]
  ; CHECK-NEXT: store <8 x i64> [[TMP]], <8 x i64>* [[ARG1]]
  ; CHECK-NEXT: ret void

; bb:
%tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}
define void @avx512_legal512_prefer256_call_avx512_legal256_prefer256(<8 x i64>* %arg) #1 {
 ; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
 ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]])
 ; CHECK-NEXT: bb:
 ; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
 ; CHECK-NEXT: [[TMP2:%.*]] = alloca <8 x i64>, align 32
 ; CHECK-NEXT: [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
 ; CHECK-NEXT: call void @llvm.memset.p0i8.i64(i8* align 32 [[TMP3]], i8 0, i64 32, i1 false)
 ; CHECK-NEXT: call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(<8 x i64>* [[TMP2]], <8 x i64>* [[TMP]])
 ; CHECK-NEXT: [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
 ; CHECK-NEXT: store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
 ; CHECK-NEXT: ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(<8 x i64>* %arg, <8 x i64>*readonly %arg1) #3 {
 ; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256
 ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64>* [[ARG1_VAL:%.*]])
 ; CHECK-NEXT: bb:
 ; CHECK-NEXT: store <8 x i64> [[ARG1_VAL]], <8 x i64>* [[ARG]]
 ; CHECK-NEXT: ret void
 ;
 ; bb:
 %tmp = load <8 x i64>, <8 x i64>* %arg
 store <8 x i64> %tmp, <8 x i64>* %arg
 ret void
}

define void @avx2_legal256_prefer256_call_avx2_legal512_prefer256(<8 x i64>* %arg) #4 {
 ; CHECK-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
 ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]])
 ; CHECK-NEXT: bb:
 ; CHECK-NEXT: [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:  [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:  [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
; CHECK-NEXT:  call void @llvm.memset.p0i8.i64(i8* align 32 [[TMP3]], i8 0, i64 32, i1 false)
; CHECK-NEXT:  [[TMP_VAL:.%*]] = load <8 x i64>, <8 x i64>* [[TMP]]
; CHECK-NEXT:  call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal512_prefer256(<8 x i64>* [[TMP2]], <8 x i64>* [[TMP_VAL]])
; CHECK-NEXT:  [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
; CHECK-NEXT:  store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
; CHECK-NEXT:  ret void

; This should promote
define internal fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal512_prefer256(<8 x i64>* %arg, <8 x i64>* readonly %arg1) #4 {
    ; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal512_prefer256_call_avx2_legal512_prefer256
    ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]], <8 x i64>* [[ARG1_VAL:%.*]])
    ; CHECK-NEXT:  bb:
    ; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], <8 x i64>* [[ARG]]
    ; CHECK-NEXT:    ret void

    bb:
    %tmp = load <8 x i64>, <8 x i64>* %arg1
    store <8 x i64> %tmp, <8 x i64>* %arg
    ret void
}

define void @avx2_legal512_prefer256_call_avx2_legal512_prefer256(<8 x i64>* %arg) #3 {
    ; CHECK-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal512_prefer256
    ; CHECK-SAME: (<8 x i64>* [[ARG:%.*]])
    ; CHECK-NEXT:  bb:
    ; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
    ; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
    ; CHECK-NEXT:    [[TMP3:%.*]] = bitcast <8 x i64>* [[TMP]] to i8*
    ; CHECK-NEXT:    call void @llvm.memset.p0i8.i64(i8* align 32 [[TMP3]], i8 0, i64 32, i1 false)
    ; CHECK-NEXT:    [[TMP_VAL:.%*]] = load <8 x i64>, <8 x i64>* [[TMP]]
    ; CHECK-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal512_prefer256(<8 x i64>* [[TMP2]], <8 x i64>* [[TMP_VAL]])

    ; CHECK-NEXT:  bb:
    %tmp = alloca <8 x i64>, align 32
    %tmp2 = alloca <8 x i64>, align 32
    %tmp3 = bitcast <8 x i64>* %tmp to i8*
    call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal512_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
    %tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
    store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
    ret void
}
; CHECK-NEXT:  [[TMP4:%.*]] = load <8 x i64>, <8 x i64>* [[TMP2]], align 32
; CHECK-NEXT:  store <8 x i64> [[TMP4]], <8 x i64>* [[ARG]], align 2
; CHECK-NEXT:  ret void

bb:
%tmp = alloca <8 x i64>, align 32
%tmp2 = alloca <8 x i64>, align 32
%tmp3 = bitcast <8 x i64>* %tmp to i8*
call void @llvm.memset.p0i8.i64(i8* align 32 %tmp3, i8 0, i64 32, i1 false)
call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(<8 x i64>* %tmp2, <8 x i64>* %tmp)
%tmp4 = load <8 x i64>, <8 x i64>* %tmp2, align 32
store <8 x i64> %tmp4, <8 x i64>* %arg, align 2
ret void
}

; Function Attrs: argmemonly nounwind
declare void @llvm.memset.p0i8.i64(i8* nocapture writeonly, i8, i64, i1) #5

attributes #0 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-width"="512" "prefer-vector-width"="512" }
attributes #1 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-width"="512" "prefer-vector-width"="256" }
attributes #2 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-width"="256" "prefer-vector-width"="256" }
attributes #3 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="512" "prefer-vector-width"="256" }
attributes #4 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="256" "prefer-vector-width"="256" }
attributes #5 = { argmemonly nounwind }

; RUN: llc -O3 -mtriple=powerpc-unknown-linux-gnu -mcpu=e500 -mattr=spe < %s | FileCheck %s

; PowerPC SPE is a rare in-tree target that has the FP_TO_SINT node marked
; as Legal.

; Verify that fptosi(42.1) isn't simplified when the rounding mode is
; unknown.
; Verify that no gross errors happen.
; CHECK-LABEL: @f20
; COMMON: cfdctsiz
define i32 @f20(double %a) strictfp {
  entry:
  %result = call i32 @llvm.experimental.constrained.fptosi.i32.f64(double 42.1, metadata !"fpexcept.strict")
  strictfp
  ret i32 %result
}
@llvm.fp.env = thread_local global i8 zeroinitializer, section "llvm.metadata"
declare i32 @llvm.experimental.constrained.fptosi.i32.f64(double, metadata)
; RUN: llc < %s -mtriple=x86_64-linux-android -mattr=+mmx -enable-legalize-types-checking | FileCheck %s
; D31946
; Check that we don't end up with the ""LLVM ERROR: Cannot select" error.
; Additionally ensure that the output code actually put fp128 values in SSE registers.
declare fp128 @llvm.fabs.f128(fp128)
declare fp128 @llvm.copysign.f128(fp128, fp128)

define fp128 @TestSelect(fp128 %a, fp128 %b) {
  %cmp = fcmp ogt fp128 %a, %b
  %sub = fsub fp128 %a, %b
  %res = select i1 %cmp, fp128 %sub, fp128 0xL00000000000000000000000000000000
  ret fp128 %res
; CHECK-LABEL: TestSelect:
; CHECK     movaps 16(%rsp), %xmm1
; CHECK-NEXT  callq __subtf3
; CHECK-NEXT   testl %ebx, %ebx
; CHECK-NEXT   jg .LBB0_2
; CHECK-NEXT # %bb.1:
; CHECK-NEXT   movaps .LCPI0_0(%rip), %xmm0
; CHECK-NEXT .LBB0_2:
; CHECK-NEXT   addq $32, %rsp
; CHECK-NEXT   popq %rbx
; CHECK-NEXT   retq
}

define fp128 @TestFabs(fp128 %a) {
  %res = call fp128 @llvm.fabs.f128(fp128 %a)
  ret fp128 %res
; CHECK-LABEL: TestFabs:
; CHECK   andps .LCPI1_0(%rip), %xmm0
; CHECK-NEXT retq
}

define fp128 @TestCopysign(fp128 %a, fp128 %b) {
  %res = call fp128 @llvm.copysign.f128(fp128 %a, fp128 %b)
  ret fp128 %res
; CHECK-LABEL: TestCopysign:
; CHECK     andps .LCPI2_1(%rip), %xmm0
; CHECK-NEXT orps %xmm1, %xmm0
; CHECK-NEXT retq
}

define fp128 @TestFneg(fp128 %a) {
  %mul = fmul fp128 %a, %a

%res = fsub fp128 0xL00000000000000008000000000000000, %mul
ret fp128 %res
; CHECK-LABEL: TestFneg:
; CHECK movaps %xmm0, %xmm1
; CHECK-NEXT calq __multf3
; CHECK-NEXT xorps .LCPI3_0(%rip), %xmm0
; CHECK-NEXT popq %rax
; CHECK-NEXT retq
}

; NOTE: Assertions have been autogenerated by utils/update_analyze_test_checks.py
; RUN: opt < %s -cost-model -analyze -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx2 | FileCheck %s --check-prefixes=CHECK,VEC256,AVX
; RUN: opt < %s -cost-model -analyze -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,+prefer-256-bit | FileCheck %s --check-prefixes=CHECK,VEC256,SKX256
; RUN: opt < %s -cost-model -analyze -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,-prefer-256-bit | FileCheck %s --check-prefixes=CHECK,VEC512

define void @zext256() "min-legal-vector-width"="256" {
; VEC256-LABEL: 'zext256'
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; VEC256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; VEC256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %D = zext <16 x i16> undef to <16 x i32>
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; VEC256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; VEC512-LABEL: 'zext256'
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; VEC512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void

%A = zext <8 x i16> undef to <8 x i64>
%B = zext <8 x i32> undef to <8 x i64>
%C = zext <16 x i8> undef to <16 x i32>
%D = zext <16 x i16> undef to <16 x i32>
%E = zext <32 x i8> undef to <32 x i16>

ret void
}

define void @zext512() "min-legal-vector-width"="512" { 
 ; AVX-LABEL: 'zext512'
 ; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %A = zext <8 x i16> undef to <8 x i64>
 ; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to <8 x i64>
 ; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
 ; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %D = zext <16 x i16> undef to <16 x i32>
 ; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to <32 x i16>
 ; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
 ;
 ; SKX256-LABEL: 'zext512'
 ; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x i64>
 ; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
 ; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x i32>
 ; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x i32>
 ; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x i16>
 ; SKX256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
 ;
 ; VEC512-LABEL: 'zext512'
 ; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x i64>
 ; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
 ; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x i32>
 ; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x i32>
 ; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x i16>
 ; VEC512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
 ;
 ; %A = zext <8 x i16> undef to <8 x i64>
 ; %B = zext <8 x i32> undef to <8 x i64>
 ; %C = zext <16 x i8> undef to <16 x i32>
 ; %D = zext <16 x i16> undef to <16 x i32>
 ; %E = zext <32 x i8> undef to <32 x i16>

ret void
}
define void @sext256() "min-legal-vector-width"="256" { 
; VEC256-LABEL: 'sext256'
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; VEC256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; VEC256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; VEC256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; VEC256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void 
;
; VEC512-LABEL: 'sext256'
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; VEC512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; VEC512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void 
;
%A = sext <8 x i8> undef to <8 x i64>
%B = sext <8 x i16> undef to <8 x i64>
%C = sext <8 x i32> undef to <8 x i64>
%D = sext <16 x i8> undef to <16 x i32>
%E = sext <16 x i16> undef to <16 x i32>
%F = sext <32 x i8> undef to <32 x i16>
ret void 
}

define void @sext512() "min-legal-vector-width"="512" { 
; AVX-LABEL: 'sext512'
; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void 
;
%A = sext <8 x i8> undef to <8 x i64>
%B = sext <8 x i16> undef to <8 x i64>
%C = sext <8 x i32> undef to <8 x i64>
%D = sext <16 x i8> undef to <16 x i32>
%E = sext <16 x i16> undef to <16 x i32>
%F = sext <32 x i8> undef to <32 x i16>
ret void 
}
# The agreement for individuals can be filled out on the web.
# When adding J Random Contributor's name to this file,
# either J's name or J's organization's name should be
# added to the AUTHORS file, depending on whether the
# individual or corporate CLA was used.
#
# Names should be added to this file as:
#     Name <email address>
#
# Please keep the list sorted.

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Arne Beer <arne@twobeer.de>
Billy Robert O'Neal III <billy.oneal@gmail.com> <bion@microsoft.com>
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Ray Glover <ray.glover@uk.ibm.com>
Robert Guo <robert.guo@mongodb.com>
Roman Lebedev <lebedev.ri@gmail.com>
; Check that for i8 type, the maximum legal offset is 31.
; Also check that an constant used as value to be stored rather than
; pointer in a store instruction is hoisted.
; CHECK: foo_i8

; CHECK-DAG: %[[C1:const[0-9]??]] = bitcast i32 805874720 to i32
; CHECK-DAG: %[[C2:const[0-9]??]] = bitcast i32 805874688 to i32
; CHECK-DAG: %[[C3:const[0-9]??]] = bitcast i32 805873720 to i32
; CHECK-DAG: %[[C4:const[0-9]??]] = bitcast i32 805873688 to i32
; CHECK: %0 = inttoptr i32 %[[C2]] to i8*
; CHECK-NEXT: %1 = load volatile i8, i8* %0
; CHECK-NEXT: %[[M1:const_mat[0-9]??]] = add i32 %[[C2]], 4
; CHECK-NEXT: %2 = inttoptr i32 %[[M1]] to i8*
; CHECK-NEXT: %3 = load volatile i8, i8* %2
; CHECK-NEXT: %[[M2:const_mat[0-9]??]] = add i32 %[[C2]], 31
; CHECK-NEXT: %4 = inttoptr i32 %[[M2]] to i8*
; CHECK-NEXT: %5 = load volatile i8, i8* %4
; CHECK-NEXT: %6 = inttoptr i32 %[[C1]] to i8*
; CHECK-NEXT: %7 = load volatile i8, i8* %6
; CHECK-NEXT: %[[M3:const_mat[0-9]??]] = add i32 %[[C1]], 7
; CHECK-NEXT: %8 = inttoptr i32 %[[M3]] to i8*
; CHECK-NEXT: %9 = load volatile i8, i8* %8
; CHECK-NEXT: %[[M4:const_mat[0-9]??]] = add i32 %[[C4]], 31
; CHECK-NEXT: %10 = inttoptr i32 %[[C4]] to i8*
; CHECK-NEXT: store i8 %9, i8* %10
; CHECK-NEXT: %[[M5:const_mat[0-9]??]] = add i32 %[[C4]], 7
; CHECK-NEXT: %11 = inttoptr i32 %[[M4]] to i8*
; CHECK-NEXT: store i8 %7, i8* %11
; CHECK-NEXT: %12 = inttoptr i32 %[[C3]] to i8*
; CHECK-NEXT: store i8 %5, i8* %12
; CHECK-NEXT: %[[M6:const_mat[0-9]??]] = add i32 %[[C1]], 80
; CHECK-NEXT: %13 = inttoptr i32 %[[M5]] to i8*
; CHECK-NEXT: store i8 %3, i8* %13
; CHECK-NEXT: %14 = inttoptr i32 %[[M6]] to i8*
; CHECK-NEXT: store i8* %14, i8** @goo

@goo = global i8* undef

define void @foo_i8() {
entry:
%0 = load volatile i8, i8* inttoptr (i32 805874688 to i8*)
%1 = load volatile i8, i8* inttoptr (i32 805874692 to i8*)
%2 = load volatile i8, i8* inttoptr (i32 805874719 to i8*)
%3 = load volatile i8, i8* inttoptr (i32 805874720 to i8*)
%4 = load volatile i8, i8* inttoptr (i32 805874727 to i8*)
store i8 %4, i8* inttoptr(i32 805873688 to i8*)
store i8 %3, i8* inttoptr(i32 805873719 to i8*)
store i8 %2, i8* inttoptr(i32 805873720 to i8*)
store i8 %1, i8* inttoptr(i32 805873727 to i8*)
store i8* inttoptr(i32 805874800 to i8*), i8** @goo
ret void
}

; Check that for i16 type, the maximum legal offset is 62.
; CHECK: foo_i16
; CHECK-DAG: %[[C1:const[0-9]??]] = bitcast i32 805874752 to i32
; CHECK-DAG: %[[C2:const[0-9]??]] = bitcast i32 805874688 to i32
; CHECK: %0 = inttoptr i32 %[[C2]] to i16*
; CHECK-NEXT: %1 = load volatile i16, i16* %0, align 2
; CHECK-NEXT: %[[M1:const_mat[0-9]??]] = add i32 %[[C2]], 4
; CHECK-NEXT: %2 = inttoptr i32 %[[M1]] to i16*
; CHECK-NEXT: %3 = load volatile i16, i16* %2, align 2
; CHECK-NEXT: %[[M2:const_mat[0-9]??]] = add i32 %[[C2]], 32
; CHECK-NEXT: %4 = inttoptr i32 %[[M2]] to i16*
; CHECK-NEXT: %5 = load volatile i16, i16* %4, align 2
; CHECK-NEXT: %[[M3:const_mat[0-9]??]] = add i32 %[[C2]], 62
; CHECK-NEXT: %6 = inttoptr i32 %[[M3]] to i16*
; CHECK-NEXT: %7 = load volatile i16, i16* %6, align 2
; CHECK-NEXT: %8 = inttoptr i32 %[[C1]] to i16*
; CHECK-NEXT: %9 = load volatile i16, i16* %8, align 2
; CHECK-NEXT: %[[M4:const_mat[0-9]??]] = add i32 %[[C1]], 22
; CHECK-NEXT: %10 = inttoptr i32 %[[M4]] to i16*
; CHECK-NEXT: %11 = load volatile i16, i16* %10, align 2

define void @foo_i16() {
entry:
%0 = load volatile i16, i16* inttoptr (i32 805874688 to i16*), align 2
%1 = load volatile i16, i16* inttoptr (i32 805874692 to i16*), align 2
%2 = load volatile i16, i16* inttoptr (i32 805874720 to i16*), align 2
%3 = load volatile i16, i16* inttoptr (i32 805874750 to i16*), align 2
%4 = load volatile i16, i16* inttoptr (i32 805874752 to i16*), align 2
%5 = load volatile i16, i16* inttoptr (i32 805874774 to i16*), align 2
ret void
}

; Check that for i32 type, the maximum legal offset is 124.
; CHECK: foo_i32
define void @foo_i32() {
  entry:
  %0 = load volatile i32, i32* inttoptr (i32 805874688 to i32*), align 4
  %1 = load volatile i32, i32* inttoptr (i32 805874692 to i32*), align 4
  %2 = load volatile i32, i32* inttoptr (i32 805874812 to i32*), align 4
  %3 = load volatile i32, i32* inttoptr (i32 805874816 to i32*), align 4
  %4 = load volatile i32, i32* inttoptr (i32 805874824 to i32*), align 4
  %5 = load volatile i32, i32* inttoptr (i32 805874828 to i32*), align 4
  ret void
}

define void @autogen_SD4739(i8*) {
  ; CHECK-NOT: Expected a GR32Bit register, but got a GRX32Bit register
  BB:
  %L34 = load i8, i8* %0
  %Cmp56 = icmp sgt i8 undef, %L34
  br label %CF246

  CF246:                                   ; preds = %CF246, %BB
  %SI163 = select i1 %Cmp56, i8 %L34, i8 undef
  br i1 undef, label %CF246, label %CF248

  CF248:                                  ; preds = %CF248, %CF246
  store i8 %SI163, i8* %0
  br label %CF248
}
A shuffle mask with all undef elements is always legal.

```assembly
define <4 x i32> @PR41535(<2 x i32> %p1, <2 x i32> %p2) {
; CHECK-BEGIN: PR41535:
; CHECK:    // %bb.0:
; CHECK-BEGIN: ext v0.8b, v0.8b, v1.8b, #4
; CHECK-BEGIN: mov v0.d[1], v0.d[0]
; CHECK-BEGIN: ret
%cat1 = shufflevector <2 x i32> %p1, <2 x i32> undef, <4 x i32> <i32 undef, i32 1, i32 undef, i32 undef>
%cat2 = shufflevector <2 x i32> %p2, <2 x i32> undef, <4 x i32> <i32 0, i32 undef, i32 undef, i32 undef>
%r = shufflevector <4 x i32> %cat1, <4 x i32> %cat2, <4 x i32> <i32 undef, i32 undef, i32 1, i32 4>
ret <4 x i32> %r
}
```

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; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 -mattr=prefer-256-bit | FileCheck %s --check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 -mattr=prefer-256-bit,avx512vbmi | FileCheck %s --check-prefixes=CHECK,CHECK-VBMI
; Make sure CPUs default to prefer-256-bit. avx512vnni isn't interesting as it just adds an isel peephole for vpmaddwd+vpaddd
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 | FileCheck %s --check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=cascadelake | FileCheck %s --check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=cooperlake | FileCheck %s --check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=cannonlake | FileCheck %s --check-prefixes=CHECK,CHECK-VBMI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=icelake-client | FileCheck %s --check-prefixes=CHECK,CHECK-VBMI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=icelake-server | FileCheck %s --check-prefixes=CHECK,CHECK-VBMI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=tigerlake | FileCheck %s --check-prefixes=CHECK,CHECK-VBMI

; This file primarily contains tests for specific places in X86ISelLowering.cpp that needed be made aware of the legalizer not allowing 512-bit vectors due to prefer-256-bit even though AVX512 is enabled.

define void @add256(<16 x i32>* %a, <16 x i32>* %b, <16 x i32>* %c) "min-legal-vector-width"="256" {
; CHECK-LABEL: add256:
; CHECK:       # %bb.0:
; CHECK-NEXT:  vmovdq (%rdi), %ymm0
; CHECK-NEXT:  vmovdq 32(%rdi), %ymm1
; CHECK-NEXT:  vpaddd 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:  vpaddd (%rsi), %ymm0, %ymm0

define void @add512(<16 x i32>* %a, <16 x i32>* %b, <16 x i32>* %c) "min-legal-vector-width"="512" {
    ; CHECK-LABEL: add512:
    ; CHECK:       # %bb.0:
    ; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
    ; CHECK-NEXT:    vpaddd (%rsi), %zmm0, %zmm0
    ; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
    ; CHECK-NEXT:    vzeroupper
    ; CHECK-NEXT:    retq
    %d = load <16 x i32>, <16 x i32>* %a
    %e = load <16 x i32>, <16 x i32>* %b
    %f = add <16 x i32> %d, %e
    store <16 x i32> %f, <16 x i32>* %c
    ret void
}

define void @avg_v64i8_256(<64 x i8>* %a, <64 x i8>* %b) "min-legal-vector-width"="256" {
    ; CHECK-LABEL: avg_v64i8_256:
    ; CHECK:       # %bb.0:
    ; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
    ; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
    ; CHECK-NEXT:    vpavgb (%rdi), %ymm0, %ymm0
    ; CHECK-NEXT:    vpavgb 32(%rdi), %ymm1, %ymm1
    ; CHECK-NEXT:    vmovdqu %ymm1, (%rax)
    ; CHECK-NEXT:    vmovdqu %ymm0, (%rax)
    ; CHECK-NEXT:    vzeroupper
    ; CHECK-NEXT:    retq
    %1 = load <64 x i8>, <64 x i8>* %a
    %2 = load <64 x i8>, <64 x i8>* %b
    %3 = zext <64 x i8> %1 to <64 x i32>
    %4 = zext <64 x i8> %2 to <64 x i32>
    %5 = add nuw nsw <64 x i32> %3, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
    %6 = add nuw nsw <64 x i32> %5, %4
    %7 = lshr %6 <64 x i32> %7, %6
    ; CHECK-NEXT:    retq
}

define void @avg_v64i8_512(<64 x i8>* %a, <64 x i8>* %b) "min-legal-vector-width"="512" {  
; CHECK-LABEL: avg_v64i8_512:  
; CHECK:   # %bb.0:  
; CHECK-NEXT: vmovdqa64 (%rsi), %zmm0  
; CHECK-NEXT: vpavgb (%rdi), %zmm0, %zmm0  
; CHECK-NEXT: vmovdqu64 %zmm0, (%rax)  
; CHECK-NEXT: vzeroupper  
; CHECK-NEXT: retq  
%1 = load <64 x i8>, <64 x i8>* %a  
%2 = load <64 x i8>, <64 x i8>* %b  
%3 = zext <64 x i8> %1 to <64 x i32>  
%4 = zext <64 x i8> %2 to <64 x i32>  
%5 = add nuw nsw <64 x i32> %3, <64 x i32> %2  
%6 = add nuw nsw <64 x i32> %5, %4  
%7 = lshr <64 x i32> %6, <64 x i32> %7  
store <64 x i8> %7, <64 x i8>* undef, align 4  
ret void  
}
%a = sext <32 x i16> %A to <32 x i32>
%b = sext <32 x i16> %B to <32 x i32>
%m = mul nsw <32 x i32> %a, %b
%odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> %i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32 12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
%even = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> %i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32 13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
%ret = add <16 x i32> %odd, %even
store <16 x i32> %ret, <16 x i32>* %CPtr
ret void
}

define void @pmaddwd_32_512(<32 x i16>* %APtr, <32 x i16>* %BPtr, <16 x i32>* %CPtr) "min-legal-vector-width"="512" {
; CHECK-LABEL: pmaddwd_32_512:
; CHECK: # %bb.0:
; CHECK-NEXT: vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT: vpmaddwd (%rsi), %zmm0, %zmm0
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%A = load <32 x i16>, <32 x i16>* %APtr
%B = load <32 x i16>, <32 x i16>* %BPtr
%a = sext <32 x i16> %A to <32 x i32>
%b = sext <32 x i16> %B to <32 x i32>
%m = mul nsw <32 x i32> %a, %b
%odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> %i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32 12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
%even = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> %i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32 13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
%ret = add <16 x i32> %odd, %even
store <16 x i32> %ret, <16 x i32>* %CPtr
ret void
}

define void @psubus_64i8_max_256(<64 x i8>* %xptr, <64 x i8>* %yptr, <64 x i8>* %zptr) "min-legal-vector-width"="256" {
; CHECK-LABEL: psubus_64i8_max_256:
; CHECK: # %bb.0:
; CHECK-NEXT: vmovdqa (%rdi), %ymm0
; CHECK-NEXT: vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT: vpsubusb 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT: vpsubusb (%rsi), %ymm0, %ymm0
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%x = load <64 x i8>, <64 x i8>* %xptr
%y = load <64 x i8>, <64 x i8>* %yptr
%cmp = icmp ult <64 x i8> %x, %y
%max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
%res = sub <64 x i8> %max, %y
store <64 x i8> %res, <64 x i8>* %zptr
ret void
}

define void @psubus_64i8_max_512(<64 x i8>* %xptr, <64 x i8>* %yptr, <64 x i8>* %zptr) "min-legal-vector-width=""512" {
; CHECK-LABEL: psubus_64i8_max_512:
; CHECK: # %bb.0:
; CHECK-NEXT: vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT: vpsubusb (%rsi), %zmm0, %zmm0
; CHECK-NEXT: vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%x = load <64 x i8>, <64 x i8>* %xptr
%y = load <64 x i8>, <64 x i8>* %yptr
%cmp = icmp ult <64 x i8> %x, %y
%max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
%res = sub <64 x i8> %max, %y
store <64 x i8> %res, <64 x i8>* %zptr
ret void
}

define i32 @_Z9test_charPcS_i_256(i8* nocapture readonly, i8* nocapture readonly, i32) "min-legal-vector-width=""256" {
; CHECK-LABEL: _Z9test_charPcS_i_256:
; CHECK: # %bb.0: # %entry
; CHECK-NEXT: movl %edx, %eax
; CHECK-NEXT: vpxor %xmm0, %xmm0, %xmm0
; CHECK-NEXT: xorl %ecx, %ecx
; CHECK-NEXT: vpxor %xmm1, %xmm1, %xmm1
; CHECK-NEXT: vpxor %xmm2, %xmm2, %xmm2
; CHECK-NEXT: .p2align 4, 0x90
; CHECK-NEXT: .LBB8_1: # %vector.body
; CHECK-NEXT: # =>This Inner Loop Header: Depth=1
; CHECK-NEXT: vpmovsxwb (%rdi,%rcx), %ymm3
; CHECK-NEXT: vpmovsxwb 16(%rdi,%rcx), %ymm4
; CHECK-NEXT: vpmovsxwb (%rsi,%rcx), %ymm5
; CHECK-NEXT: vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-NEXT: vpadd %ymm1, %ymm3, %ymm1
; CHECK-NEXT: vpmovsxwb 16(%rsi,%rcx), %ymm3
; CHECK-NEXT: vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-NEXT: vpadd %ymm2, %ymm3, %ymm2
; CHECK-NEXT: addq $32, %rcx
; CHECK-NEXT: cmpq %rcx, %rax
entry:
%3 = zext i32 %2 to i64
br label %vector.body

vector.body:
%index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
%vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitializer, %entry ]
%4 = getelementptr inbounds i8, i8* %0, i64 %index
%5 = bitcast i8* %4 to <32 x i8>*
%wide.load = load <32 x i8>, <32 x i8>* %5, align 1
%6 = sext <32 x i8> %wide.load to <32 x i32>
%7 = getelementptr inbounds i8, i8* %1, i64 %index
%8 = bitcast i8* %7 to <32 x i8>*
%wide.load14 = load <32 x i8>, <32 x i8>* %8, align 1
%9 = sext <32 x i8> %wide.load14 to <32 x i32>
%10 = mul nsw <32 x i32> %9, %6
%11 = add nsw <32 x i32> %10, %vec.phi
%index.next = add i64 %index, 32
%12 = icmp eq i64 %index.next, %3
br i1 %12, label %middle.block, label %vector.body

middle.block:
%rdx.shuf1 = shufflevector <32 x i32>, undef, <32 x i32>, undef, <32 x i32>, i32 16, i32 17, i32 18, i32 19, i32 20, i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 unde
define i32 @_Z9test_charPcS_i_512(i8* nocapture readonly, i8* nocapture readonly, i32) "min-legal-vector-width="512" {

; CHECK-LABEL: _Z9test_charPcS_i_512:
; CHECK:
;   # %bb.0: # %entry
; CHECK-NEXT:  movl %edx, %eax
; CHECK-NEXT:  vpxor %xmm0, %xmm0, %xmm0
; CHECK-NEXT:  xorl %ecx, %ecx
; CHECK-NEXT:  vpxor %xmm1, %xmm1, %xmm1
; CHECK-NEXT:  .p2align 4, 0x90
; CHECK-NEXT:  .LBB9_1: # %vector.body
; CHECK-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
; CHECK-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-NEXT:    addq $32, %rcx
; CHECK-NEXT:    cmpq %rcx, %rax
; CHECK-NEXT:    jne .LBB9_1
; CHECK-NEXT:  # %bb.2: # %middle.block
; CHECK-NEXT:    vpadd %zmm1, %zmm2, %zmm1
; CHECK-NEXT:    vextracti64x4 $1, %zmm1, %ymm1
; CHECK-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-NEXT:    vpshufb {{.*#+}} xmm1 = xmm0[2,3,0,1]
; CHECK-NEXT:    vpadd %xmm1, %xmm0, %xmm0
; CHECK-NEXT:    vpshufb {{.*#+}} xmm1 = xmm0[1,1,2,3]
; CHECK-NEXT:    vmovd %xmm0, %eax
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:  retq

}
entry:
  %3 = zext i32 %2 to i64
br label %vector.body

vector.body:
  %index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
  %vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitiializer, %entry ]
  %4 = getelementptr inbounds i8, i8* %0, i64 %index
  %5 = bitcast i8* %4 to <32 x i8>*
  %wide.load = load <32 x i8>, <32 x i8>* %5, align 1
  %6 = sext <32 x i8> %wide.load to <32 x i32>
  %7 = getelementptr inbounds i8, i8* %1, i64 %index
  %8 = bitcast i8* %7 to <32 x i8>*
  %wide.load14 = load <32 x i8>, <32 x i8>* %8, align 1
  %9 = sext <32 x i8> %wide.load14 to <32 x i32>
  %10 = mul nsw <32 x i32> %9, %6
  %11 = add nsw <32 x i32> %10, %vec.phi
  %index.next = add i64 %index, 32
  %12 = icmp eq i64 %index.next, %3
br i1 %12, label %middle.block, label %vector.body

middle.block:
  %rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32> undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20, i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undefined
  %bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
  %rdx.shuf = shufflevector <32 x i32> %bin.rdx1, <32 x i32> undef, <32 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 unde
  %bin.rdx = add <32 x i32> %bin.rdx1, %rdx.shuf
  %rdx.shuf15 = shufflevector <32 x i32> %bin.rdx, <32 x i32> undef, <32 x i32> <i32 4, i32 5, i32 6, i32 7, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undefined
  %bin.rdx32 = add <32 x i32> %bin.rdx, %rdx.shuf15
  %rdx.shuf17 = shufflevector <32 x i32> %bin.rdx32, <32 x i32> undef, <32 x i32> <i32 2, i32 3, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undefined
  %bin.rdx18 = add <32 x i32> %bin.rdx32, %rdx.shuf17
  %rdx.shuf19 = shufflevector <32 x i32> %bin.rdx18, <32 x i32> undef, <32 x i32> <i32 1, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undefined
  %bin.rdx20 = add <32 x i32> %bin.rdx18, %rdx.shuf19
  %13 = extractelement <32 x i32> %bin.rdx20, i32 0
ret i32 %13
}

@a = global [1024 x i8] zeroinitializer, align 16
@b = global [1024 x i8] zeroinitializer, align 16

define i32 @sad_16i8_256() "min-legal-vector-width"="256" {
  ; CHECK-LABEL: sad_16i8_256:
  ; CHECK:     # %bb.0: # %entry
  ; CHECK-NEXT: vpxor %xmm0, %xmm0, %xmm0
  ; CHECK-NEXT: movq $-1024, %rax # imm = 0xFC00
  ; CHECK-NEXT: vpxor %xmm1, %xmm1, %xmm1
  ; CHECK-NEXT: .p2align 4, 0x90
  ; CHECK-NEXT:  .LBB10_1: # %vector.body
  ; CHECK-NEXT:    # =>This Inner Loop Header: Depth=1
  ; CHECK-NEXT:    vmovdqu a+1024(%rax), %xmm2
  ; CHECK-NEXT:    vpsadbw b+1024(%rax), %xmm2
  ; CHECK-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
  ; CHECK-NEXT:    addq $4, %rax
  ; CHECK-NEXT:    jne .LBB10_1
  ; CHECK-NEXT:  # %bb.2: # %middle.block
  ; CHECK-NEXT:    vpaddd %ymm1, %ymm1, %ymm0
  ; CHECK-NEXT:    vextracti128 $1, %ymm0, %xmm1
  ; CHECK-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
  ; CHECK-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,0,1]
  ; CHECK-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
  ; CHECK-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,2,3]
  ; CHECK-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
  ; CHECK-NEXT:    vmovd %xmm0, %eax
  ; CHECK-NEXT:    vzeroupper
  ; CHECK-NEXT:    retq
  entry:
  br label %vector.body

vector.body:
  %index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
  %vec.phi = phi <16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
  %0 = getelementptr inbounds [1024 x i8], [1024 x i8]* @a, i64 0, i64 %index
  %1 = bitcast i8* %0 to <16 x i8>*
  %wide.load = load <16 x i8>, <16 x i8>* %1, align 4
  %2 = zext <16 x i8> %wide.load to <16 x i32>
  %3 = getelementptr inbounds [1024 x i8], [1024 x i8]* @b, i64 0, i64 %index
  %4 = bitcast i8* %3 to <16 x i8>*
  %wide.load1 = load <16 x i8>, <16 x i8>* %4, align 4
  %5 = zext <16 x i8> %wide.load1 to <16 x i32>
  %6 = sub nsw <16 x i32> %2, %5
  %7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1>
%8 = sub nsw <16 x i32> zeroinitializer, %6
%9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
%10 = add nsw <16 x i32> %9, %vec.phi
%index.next = add i64 %index, 4
%11 = icmp eq i64 %index.next, 1024
br i1 %11, label %middle.block, label %vector.body

middle.block:
%.lcssa = phi <16 x i32> [ %10, %vector.body ]
%rdx.shuf = shufflevector <16 x i32> %.lcssa, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx = add <16 x i32> %.lcssa, %rdx.shuf
%rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32 8, i32 9, i32 10, i32 11, i32 12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
%rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> <i32 2, i32 3, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
%rdx.shuf4 = shufflevector <16 x i32> %bin.rdx3, <16 x i32> <i32 1, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
%12 = extractelement <16 x i32> %bin.rdx4, i32 0
ret i32 %12

define i32 @sad_16i8_512() "min-legal-vector-width"="512" {
 ; CHECK-LABEL: sad_16i8_512:
 ; CHECK:       # %bb.0: # %entry
 ; CHECK-NEXT:  vpxor %xmm0, %xmm0, %xmm0
 ; CHECK-NEXT:  movq $-1024, %rax # imm = 0xFC00
 ; CHECK-NEXT:  .p2align 4, 0x90
 ; CHECK-NEXT:  .LBB11_1: # %vector.body
 ; CHECK-NEXT:    # =>This Inner Loop Header: Depth=1
 ; CHECK-NEXT:    vmovdqu a+1024(%rax), %xmm1
 ; CHECK-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
 ; CHECK-NEXT:    vpadd %zmm0, %zmm1, %zmm0
 ; CHECK-NEXT:    addq $4, %rax
 ; CHECK-NEXT:    jne .LBB11_1
 ; CHECK-NEXT:    vextracti64x4 %zmm1, %zmm1, %zmm1
 ; CHECK-NEXT:    vpadd %zmm1, %zmm1, %zmm0
 ; CHECK-NEXT:    vextracti128 $1, %zmm0, %xmm1
 ; CHECK-NEXT:    vpadd %zmm1, %zmm0, %zmm0
 ; CHECK-NEXT:    vpshufd {{.*#+}} %xmm1 = %zmm0[2,3,0,1]
 ; CHECK-NEXT:    vpadd %zmm1, %zmm0, %zmm0

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entry:
br label %vector.body

vector.body:
%index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
%vec.phi = phi <16 x i32> [ zeroinitialize, %entry ], [ %10, %vector.body ]
%0 = getelementptr inbounds [1024 x i8], [1024 x i8]* @a, i64 0, i64 %index
%1 = bitcast i8* %0 to <16 x i8>*
%wide.load = load <16 x i8>, <16 x i8>* %1, align 4
%2 = zext <16 x i8> %wide.load to <16 x i32>
%3 = getelementptr inbounds [1024 x i8], [1024 x i8]* @b, i64 0, i64 %index
%4 = bitcast i8* %3 to <16 x i8>*
%wide.load1 = load <16 x i8>, <16 x i8>* %4, align 4
%5 = zext <16 x i8> %wide.load1 to <16 x i32>
%6 = sub nsw <16 x i32> %2, %5
%7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1>
%8 = sub nsw <16 x i32> zeroinitialize, %6
%9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
%10 = add nsw <16 x i32> %9, %vec.phi
%index.next = add i64 %index, 1024
br i1 %11, label %middle.block, label %vector.body

middle.block:
%.lcssa = phi <16 x i32> [ %10, %vector.body ]
%rdx.shuf = shufflevector <16 x i32> %.lcssa, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx = add <16 x i32> %.lcssa, %rdx.shuf
%rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> undef, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
%rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> undef, <16 x i32> <i32 2, i32 3, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
%rdx.shuf4 = shufflevector <16 x i32> %bin.rdx3, <16 x i32> undef, <16 x i32> <i32 1, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
%bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
%12 = extractelement <16 x i32> %bin.rdx4, i32 0
ret i32 %12
define void @sbto16f32_256(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="256" {
    ; CHECK-LABEL: sbto16f32_256:
    ; CHECK:       # %bb.0:
    ; CHECK-NEXT:  vpmovw2m %ymm0, %k0
    ; CHECK-NEXT:  kshiftrw $8, %k0, %k1
    ; CHECK-NEXT:  vpmovm2d %k1, %ymm0
    ; CHECK-NEXT:  vcvtdq2ps %ymm0, %ymm0
    ; CHECK-NEXT:  vpmovm2d %k0, %ymm1
    ; CHECK-NEXT:  vcvtdq2ps %ymm1, %ymm1
    ; CHECK-NEXT:  vmovaps %ymm1, (%rdi)
    ; CHECK-NEXT:  vmovaps %ymm0, 32(%rdi)
    ; CHECK-NEXT:  vzeroupper
    ; CHECK-NEXT:  retq
    %mask = icmp slt <16 x i16> %a, zeroinitializer
    %1 = sitofp <16 x i1> %mask to <16 x float>
    store <16 x float> %1, <16 x float>* %res
    ret void
}

define void @sbto16f32_512(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="512" {
    ; CHECK-LABEL: sbto16f32_512:
    ; CHECK:       # %bb.0:
    ; CHECK-NEXT:  vpmovw2m %ymm0, %k0
    ; CHECK-NEXT:  vpmovm2d %k0, %zmm0
    ; CHECK-NEXT:  vcvtdq2ps %zmm0, %zmm0
    ; CHECK-NEXT:  vmovaps %zmm0, (%rdi)
    ; CHECK-NEXT:  vzeroupper
    ; CHECK-NEXT:  retq
    %mask = icmp slt <16 x i16> %a, zeroinitializer
    %1 = sitofp <16 x i1> %mask to <16 x float>
    store <16 x float> %1, <16 x float>* %res
    ret void
}

define void @sbto16f64_256(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="256" {
    ; CHECK-LABEL: sbto16f64_256:
    ; CHECK:       # %bb.0:
    ; CHECK-NEXT:  vpmovw2m %ymm0, %k0
    ; CHECK-NEXT:  kshiftrw $8, %k0, %k1
    ; CHECK-NEXT:  vpmovm2d %k1, %ymm0
    ; CHECK-NEXT:  vcvtdq2pd %xmm0, %ymm0
    ; CHECK-NEXT:  vextracti128 $1, %ymm0, %xmm0
    ; CHECK-NEXT:  vcvtdq2pd %xmm0, %ymm1
    ; CHECK-NEXT:  vpmovm2d %k0, %ymm2
    ; CHECK-NEXT:  vcvtdq2pd %xmm2, %ymm3
    ; CHECK-NEXT:  vextracti128 $1, %ymm2, %xmm2
}
; CHECK-NEXT: vcvtdq2pd %xmm2, %ymm2
; CHECK-NEXT: vmovaps %ymm2, 32(%rdi)
; CHECK-NEXT: vmovaps %ymm3, (%rdi)
; CHECK-NEXT: vmovaps %ymm0, 96(%rdi)
; CHECK-NEXT: vmovaps %ymm1, 64(%rdi)
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%mask = icmp slt <16 x i16> %a, zeroinitializer
%1 = sitofp <16 x i1> %mask to <16 x double>
store <16 x double> %1, <16 x double>* %res
ret void
}
define void @sbto16f64_512(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: sbto16f64_512:
; CHECK: # %bb.0:
; CHECK-NEXT: vpmovw2m %ymm0, %k0
; CHECK-NEXT: vpmovm2d %k0, %zmm0
; CHECK-NEXT: vcvtdq2pd %ymm0, %zmm1
; CHECK-NEXT: vextracti64x4 $1, %zmm0, %ymm0
; CHECK-NEXT: vcvtdq2pd %ymm0, %zmm0
; CHECK-NEXT: vmovaps %zmm0, 64(%rdi)
; CHECK-NEXT: vmovaps %zmm1, (%rdi)
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%mask = icmp slt <16 x i16> %a, zeroinitializer
%1 = sitofp <16 x i1> %mask to <16 x double>
store <16 x double> %1, <16 x double>* %res
ret void
}
define void @ubto16f32_256(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f32_256:
; CHECK: # %bb.0:
; CHECK-NEXT: vpmovw2m %ymm0, %k0
; CHECK-NEXT: kshiftrw $8, %k0, %k1
; CHECK-NEXT: vpmovm2d %k1, %ymm0
; CHECK-NEXT: vpsrlw $31, %ymm0, %ymm0
; CHECK-NEXT: vcvtdq2ps %ymm0, %ymm0
; CHECK-NEXT: vpmovm2d %k0, %ymm1
; CHECK-NEXT: vpsrlw $31, %ymm1, %ymm1
; CHECK-NEXT: vcvtdq2ps %ymm1, %ymm1
; CHECK-NEXT: vmovaps %ymm1, (%rdi)
; CHECK-NEXT: vmovaps %ymm0, 32(%rdi)
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%mask = icmp slt <16 x i16> %a, zeroinitializer
%1 = uitofp <16 x i1> %mask to <16 x float>
store <16 x float> %1, <16 x float>* %res
ret void
}

define void @ubto16f32_512(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: ubto16f32_512:
; CHECK:     # %bb.0:
; CHECK-NEXT: vpmovw2m %ymm0, %k0
; CHECK-NEXT: vpmovm2d %k0, %zmm0
; CHECK-NEXT: vpsrlq $31, %zmm0, %zmm0
; CHECK-NEXT: vcvtdq2ps %zmm0, %zmm0
; CHECK-NEXT: vmovaps %zmm0, (%rdi)
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%mask = icmp slt <16 x i16> %a, zeroinitializer
%1 = uitofp <16 x i1> %mask to <16 x float>
store <16 x float> %1, <16 x float>* %res
ret void
}

define void @ubto16f64_256(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f64_256:
; CHECK:     # %bb.0:
; CHECK-NEXT: vpmovw2m %ymm0, %k0
; CHECK-NEXT: kshiftrw $8, %k0, %k1
; CHECK-NEXT: vpmovm2d %k1, %ymm0
; CHECK-NEXT: vpsrlq $31, %ymm0, %ymm0
; CHECK-NEXT: vcvtdq2pd %xmm0, %ymm1
; CHECK-NEXT: vextracti128 $1, %ymm0, %xmm0
; CHECK-NEXT: vcvtdq2pd %xmm0, %ymm0
; CHECK-NEXT: vpmovm2d %k0, %ymm2
; CHECK-NEXT: vpsrlq $31, %ymm2, %ymm2
; CHECK-NEXT: vcvtdq2pd %xmm2, %ymm3
; CHECK-NEXT: vpmovm2d %k0, %ymm2
; CHECK-NEXT: vcvtdq2pd %xmm2, %ymm2
; CHECK-NEXT: vmovaps %ymm2, 32(%rdi)
; CHECK-NEXT: vmovaps %ymm3, 64(%rdi)
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%mask = icmp slt <16 x i16> %a, zeroinitializer
%1 = uitofp <16 x i1> %mask to <16 x double>
store <16 x double> %1, <16 x double>* %res
ret void
}

define void @ubto16f64_512(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="512" {

define <16 x i16> @test_16f32toub_256(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-width"="256" {
    ; CHECK-LABEL: test_16f32toub_256:
    ; CHECK: # %bb.0:
    ; CHECK-NEXT: vcvttps2dq (%rdi), %ymm1
    ; CHECK-NEXT: vpslld $31, %ymm1, %ymm1
    ; CHECK-NEXT: vpmovd2m %ymm1, %k1
    ; CHECK-NEXT: vmovdqu16 %ymm0, %ymm0 {%k1} {z}
    ; CHECK-NEXT: retq
    %a = load <16 x float>, <16 x float>* %ptr
    %mask = fptoui <16 x float> %a to <16 x i1>
    %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
    ret <16 x i16> %select
}

define <16 x i16> @test_16f32toub_512(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-width"="512" {
    ; CHECK-LABEL: test_16f32toub_512:
    ; CHECK: # %bb.0:
    ; CHECK-NEXT: vcvttps2dq (%rdi), %zmm1
    ; CHECK-NEXT: vpslld $31, %zmm1, %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k1
    ; CHECK-NEXT: vmovdqu16 %zmm0, %zmm0 {%k1} {z}
    ; CHECK-NEXT: retq
    %a = load <16 x float>, <16 x float>* %ptr
    %mask = fptoui <16 x float> %a to <16 x i1>
    ret <16 x i1> %mask
}
%select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_256(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-width"="256" {
    ; CHECK-LABEL: test_16f32tosb_256:
    ; CHECK:      # %bb.0:
    ; CHECK-NEXT: vcvtpq2dq (%rdi), %ymm1
    ; CHECK-NEXT: vpmovd2m %ymm1, %k0
    ; CHECK-NEXT: vcvtpq2dq 32(%rdi), %ymm1
    ; CHECK-NEXT: vpmovd2m %ymm1, %k1
    ; CHECK-NEXT: kunpckbw %k0, %k1, %k1
    ; CHECK-NEXT: vmovdqu16 %ymm0, %ymm0 [%k1] [z]
    ; CHECK-NEXT: retq
    %a = load <16 x float>, <16 x float>* %ptr
    %mask = fptosi <16 x float> %a to <16 x i1>
    %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
    ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_512(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-width"="512" {
    ; CHECK-LABEL: test_16f32tosb_512:
    ; CHECK:      # %bb.0:
    ; CHECK-NEXT: vcvtpq2dq (%rdi), %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k1
    ; CHECK-NEXT: vcvtpq2dq 32(%rdi), %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k1
    ; CHECK-NEXT: vcvtpq2dq 64(%rdi), %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k1
    ; CHECK-NEXT: vcvtpq2dq 128(%rdi), %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k1
    ; CHECK-NEXT: vcvtpq2dq 256(%rdi), %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k1
    ; CHECK-NEXT: vcvtpq2dq 512(%rdi), %zmm1
    ; CHECK-NEXT: vpmovd2m %zmm1, %k1
    ; CHECK-NEXT: retq
    %a = load <16 x float>, <16 x float>* %ptr
    %mask = fptosi <16 x float> %a to <16 x i1>
    %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
    ret <16 x i16> %select
}

define void @mul256(<64 x i8>* %a, <64 x i8>* %b, <64 x i8>* %c) "min-legal-vector-width"="256" {
    ; CHECK-AVX512-LABEL: mul256:
    ; CHECK-AVX512:      # %bb.0:
    ; CHECK-AVX512-NEXT: vmovdqa (%rdi), %ymm0
    ; CHECK-AVX512-NEXT: vmovdqa 32(%rdi), %ymm1
    ; CHECK-AVX512-NEXT: vmovdqa (%rsi), %ymm2
    ; CHECK-AVX512-NEXT: vmovdqa 32(%rsi), %ymm3
    ; CHECK-AVX512-NEXT: vpunpckhbw {{.*#*+}} %ymm6 = %ymm4 [%k1] [%k1]
    ; CHECK-AVX512-NEXT: vpunpckhbw {{.*#*+}} %ymm5 = %ymm4
ymm1[8], ymm0[8], ymm1[9], ymm0[9], ymm1[10], ymm0[10], ymm1[11], ymm0[11], ymm1[12], ymm0[12], ymm1[13], ymm0[13], ymm1[14], ymm0[14], ymm1[15], ymm0[15], ymm1[24], ymm0[24], ymm1[25], ymm0[25], ymm1[26], ymm0[26], ymm1[27], ymm0[27], ymm1[28], ymm0[28], ymm1[29], ymm0[29], ymm1[30], ymm0[30], ymm1[31], ymm0[31]

; CHECK-AVX512-NEXT:    vmullw %ymm4, %ymm5, %ymm4
; CHECK-AVX512-NEXT:    vmovdqa (*+*) ymm5 =
; CHECK-AVX512-NEXT:    vpunpcklbw (*+*) ymm3 =
ymm3[0], ymm0[0], ymm3[1], ymm0[1], ymm3[2], ymm0[2], ymm3[3], ymm0[3], ymm3[4], ymm0[4], ymm3[5], ymm0[5], ymm3[6], ymm0[6], ymm3[7], ymm0[7], ymm3[16], ymm0[16], ymm3[17], ymm0[17], ymm3[18], ymm0[18], ymm3[19], ymm0[19], ymm3[20], ymm0[20], ymm3[21], ymm0[21], ymm3[22], ymm0[22], ymm3[23], ymm0[23]
; CHECK-AVX512-NEXT:    vpmullw %ymm3, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm3, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpunpckhbw (*+*) ymm1 =
ymm1[0], ymm0[0], ymm1[1], ymm0[1], ymm1[2], ymm0[2], ymm1[3], ymm0[3], ymm1[4], ymm0[4], ymm1[5], ymm0[5], ymm1[6], ymm0[6], ymm1[7], ymm0[7], ymm1[16], ymm0[16], ymm1[17], ymm0[17], ymm1[18], ymm0[18], ymm1[19], ymm0[19], ymm1[20], ymm0[20], ymm1[21], ymm0[21], ymm1[22], ymm0[22], ymm1[23], ymm0[23]
; CHECK-AVX512-NEXT:    vmullw %ymm3, %ymm4, %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm4, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpunpckhbw (*+*) ymm3 =
ymm2[8], ymm0[8], ymm2[9], ymm0[9], ymm2[10], ymm0[10], ymm2[11], ymm0[11], ymm2[12], ymm0[12], ymm2[13], ymm0[13], ymm2[14], ymm0[14], ymm2[15], ymm0[15], ymm2[24], ymm0[24], ymm2[25], ymm0[25], ymm2[26], ymm0[26], ymm2[27], ymm0[27], ymm2[28], ymm0[28], ymm2[29], ymm0[29], ymm2[30], ymm0[30], ymm2[31], ymm0[31]
; CHECK-AVX512-NEXT:    vmullw %ymm2, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpackuswb %ymm3, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vunpcklbw (*+*) ymm1 =
ymm1[0], ymm0[0], ymm1[1], ymm0[1], ymm1[2], ymm0[2], ymm1[3], ymm0[3], ymm1[4], ymm0[4], ymm1[5], ymm0[5], ymm1[6], ymm0[6], ymm1[7], ymm0[7], ymm1[16], ymm0[16], ymm1[17], ymm0[17], ymm1[18], ymm0[18], ymm1[19], ymm0[19], ymm1[20], ymm0[20], ymm1[21], ymm0[21], ymm1[22], ymm0[22], ymm1[23], ymm0[23]
; CHECK-AVX512-NEXT:    vmovdqa %ymm1, (%rdx)
; CHECK-AVX512-NEXT:    vmovdqa 32(%rdx)
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq

; CHECK-VBMI-LABEL: mul256:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-VBMI-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-VBMI-NEXT:    vmovdqa 32(%rsi), %ymm3
define void @mul512(<64 x i8>* %a, <64 x i8>* %b, <64 x i8>* %c) "min-legal-vector-width"="512" {
    CHECK-AVX512-LABEL: mul512:
    CHECK-AVX512: # %bb.0:
    CHECK-AVX512-NEXT:   vmovdqa64 (%rdi), %zmm0
    CHECK-AVX512-NEXT:   vmovdqa64 (%rsi), %zmm1
    CHECK-AVX512-NEXT:   vpunpckhbw {{.*#+}} zmm2 =
      zmm1[8],zmm0[8],zmm1[9],zmm0[9],zmm1[10],zmm0[10],zmm1[11],zmm0[11],zmm1[12],zmm0[12],zmm1[13],
      zmm0[13],zmm1[14],zmm0[14],zmm1[15],zmm0[15],zmm1[24],zmm0[24],zmm1[25],zmm0[25],zmm1[26],zmm0[26],
      zmm1[27],zmm0[27],zmm1[28],zmm0[28],zmm1[29],zmm0[29],zmm1[30],zmm0[30],zmm1[31],zmm0[31],
    CHECK-AVX512-NEXT:   vpunpckhbw {{.*#+}} zmm3 =
      zmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
      2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
    CHECK-VBMI-LABEL: mul512:
    CHECK-VBMI: # %bb.0:
    CHECK-VBMI-NEXT:   vmovdqa64 (%rdi), %zmm0
    CHECK-VBMI-NEXT:   vmovdqa64 (%rsi), %zmm1
    CHECK-VBMI-NEXT:   vpunpckhbw {{.*#+}} zmm2 =
      zmm1[8],zmm0[8],zmm1[9],zmm0[9],zmm1[10],zmm0[10],zmm1[11],zmm0[11],zmm1[12],zmm0[12],zmm1[13],
      zmm0[13],zmm1[14],zmm0[14],zmm1[15],zmm0[15],zmm1[24],zmm0[24],zmm1[25],zmm0[25],zmm1[26],zmm0[26],
      zmm1[27],zmm0[27],zmm1[28],zmm0[28],zmm1[29],zmm0[29],zmm1[30],zmm0[30],zmm1[31],zmm0[31],
    ...
mm[40],zmm0[40],zmm1[41],zmm0[41],zmm1[42],zmm0[42],zmm1[43],zmm0[43],zmm1[44],zmm0[44],zmm1[45],zmm0[45],zmm1[46],zmm0[46],zmm1[47],zmm0[47],zmm1[56],zmm0[56],zmm1[57],zmm0[57],zmm1[58],zmm0[58],zmm1[59],zmm0[59],zmm1[60],zmm0[60],zmm1[61],zmm0[61],zmm1[62],zmm0[62],zmm1[63],zmm0[63]

; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm1 =

zmm1[0],zmm0[0],zmm1[1],zmm0[1],zmm1[2],zmm0[2],zmm1[3],zmm0[3],zmm1[4],zmm0[4],zmm1[5],zmm0[5],zmm1[6],zmm0[6],zmm1[7],zmm0[7],zmm1[16],zmm0[16],zmm1[17],zmm0[17],zmm1[18],zmm0[18],zmm1[19],zmm0[19],zmm1[20],zmm0[20],zmm1[21],zmm0[21],zmm1[22],zmm0[22],zmm1[23],zmm0[23],zmm1[32],zmm0[32],zmm1[33],zmm0[33],zmm1[34],zmm0[34],zmm1[35],zmm0[35],zmm1[36],zmm0[36],zmm1[37],zmm0[37],zmm1[38],zmm0[38],zmm1[39],zmm0[39],zmm1[48],zmm0[48],zmm1[49],zmm0[49],zmm1[50],zmm0[50],zmm1[51],zmm0[51],zmm1[52],zmm0[52],zmm1[53],zmm0[53],zmm1[54],zmm0[54],zmm1[55],zmm0[55]

; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm0 =
zmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,36,37,37,38,38,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63,64,64,65,65,66,66,67,67,76,76,78,78,81,81,82,82,84,84,85,85,88,88,90,90,92,92,93,93,32,32,34,34,35,35,36,36,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]

; CHECK-VBMI-NEXT:    vmovdqa64 {%k1} zmm1 =
[02,4,6,8,10,12,14,64,66,68,70,72,74,76,78,16,18,20,22,24,26,28,30,30,82,84,86,88,90,92,94,32,34,36,38,40,42,44,46,96,98,100,102,104,106,108,110,48,50,52,54,56,58,60,62,112,114,116,118,120,122,124,126]

; CHECK-VBMI-NEXT:    vpmullw %zmm2, %zmm3, %zmm2

; CHECK-VBMI-NEXT:    vzeroupper

%d = load <64 x i8>, <64 x i8>* %a
%e = load <64 x i8>, <64 x i8>* %b
%f = mul <64 x i8> %d, %e
store <64 x i8> %f, <64 x i8>* %c
ret void

; This threw an assertion at one point.
define <4 x i32> @mload_v4i32(<4 x i32> %trigger, <4 x i32>* %addr, <4 x i32> %dst) "min-legal-vector-width"="256" {

; CHECK-LABEL: mload_v4i32:
; CHECK:    # %bb.0:
; CHECK-NEXT:  vptestnmd %xmm0, %xmm0, %k1
; CHECK-NEXT:  vpblendmd (%rdi), %xmm1, %xmm0 { %k1 }
; CHECK-NEXT:  retq
%mask = icmp eq <4 x i32> %trigger, zeroinitializer
%res = call <4 x i32> @llvm.masked.load.v4i32(%addr, 4, <4 x i1> %mask, <4 x i32> %dst)
ret <4 x i32> %res
}
declare <4 x i32> @llvm.masked.load.v4i32(%addr, 4, <4 x i1> %mask, <4 x i32> %dst)
define <16 x i32> @trunc_v16i64_v16i32(<16 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i64_v16i32:
; CHECK:     # %bb.0:
; CHECK-NEXT: vmovdqa (%rdi), %ymm0
; CHECK-NEXT: vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT: vmovdqa 64(%rdi), %ymm2
; CHECK-NEXT: vmovdqa 96(%rdi), %ymm3
; CHECK-NEXT: vpmovqd %ymm0, %xmm0
; CHECK-NEXT: vpmovqd %ymm1, %xmm1
; CHECK-NEXT: vpmovqd %ymm2, %xmm2
; CHECK-NEXT: vpmovqd %ymm3, %xmm3
; CHECK-NEXT: vinseri128 $1, %xmm1, %ymm0, %ymm0
; CHECK-NEXT: vpmovqd %ymm2, %xmm1
; CHECK-NEXT: vpmovqd %ymm3, %xmm2
; CHECK-NEXT: vinseri128 $1, %ymm1, %ymm1, %ymm1
; CHECK-NEXT: retq
%a = load <16 x i64>, <16 x i64>* %x
%b = trunc <16 x i64> %a to <16 x i32>
ret <16 x i32> %b
}

define <16 x i8> @trunc_v16i64_v16i8(<16 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i64_v16i8:
; CHECK:     # %bb.0:
; CHECK-NEXT: vmovdqa (%rdi), %ymm0
; CHECK-NEXT: vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT: vmovdqa 64(%rdi), %ymm2
; CHECK-NEXT: vmovdqa 96(%rdi), %ymm3
; CHECK-NEXT: vpmovqb %ymm0, %xmm0
; CHECK-NEXT: vpmovqdb %ymm1, %xmm1
; CHECK-NEXT: vpmovqdb %ymm2, %xmm2
; CHECK-NEXT: vpmovqdb %ymm3, %xmm3
; CHECK-NEXT: vpunpckldq {{.*#+}} xmm2 = xmm2[0],xmm3[0],xmm2[1],xmm3[1]
; CHECK-NEXT: vpmovqdb %ymm1, %xmm1
; CHECK-NEXT: vpmovqdb %ymm0, %xmm0
; CHECK-NEXT: vpunpckldq {{.*#+}} xmm0 = xmm0[0],xmm1[0],xmm0[1],xmm1[1]
; CHECK-NEXT: vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm2[0]
; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%a = load <16 x i64>, <16 x i64>* %x
%b = trunc <16 x i64> %a to <16 x i8>
ret <16 x i8> %b
}

define <16 x i8> @trunc_v16i32_v16i8(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i8:
; CHECK:     # %bb.0:
; CHECK-NEXT: vmovdqa (%rdi), %ymm0
; CHECK-NEXT: vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT: vpmovdb %ymm1, %xmm1
; CHECK-NEXT: vpmovdb %ymm0, %xmm0
; CHECK-NEXT: vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm1[0]

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; CHECK-NEXT: vzeroupper
; CHECK-NEXT: retq
%a = load <16 x i32>, <16 x i32>* %x
%b = trunc <16 x i32> %a to <16 x i8>
ret <16 x i8> %b
}
define <8 x i8> @trunc_v8i64_v8i8(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-NEXT: retq
%a = load <8 x i64>, <8 x i64>* %x
%b = trunc <8 x i64> %a to <8 x i8>
ret <8 x i8> %b
}
define <8 x i16> @trunc_v8i64_v8i16(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-NEXT: retq
%a = load <8 x i64>, <8 x i64>* %x
%b = trunc <8 x i64> %a to <8 x i16>
ret <8 x i16> %b
}
define <8 x i32> @trunc_v8i64_v8i32_zeroes(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-NEXT: retq
%a = load <8 x i64>, <8 x i64>* %x
%b = lshr <8 x i64> %a to <8 x i32>
%c = trunc <8 x i64> %b to <8 x i32>
ret <8 x i32> %c
}

define <16 x i16> @trunc_v16i32_v16i16_zeroes(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i16_zeroes:
; CHECK: # %bb.0:
; CHECK-NEXT: vmovdqa (%rdi), %ymm1
; CHECK-NEXT: vmovdqa {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31]
; CHECK-NEXT: vpermi2w 32(%rdi), %ymm1, %ymm0
; CHECK-NEXT: retq
%a = load <16 x i32>, <16 x i32>* %x
%b = lshr <16 x i32> %a, <i32 16>
%c = trunc <16 x i32> %b to <16 x i16>
ret <16 x i16> %c
}

define <32 x i8> @trunc_v32i16_v32i8_zeroes(<32 x i16>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-AVX512-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-AVX512: # %bb.0:
; CHECK-AVX512-NEXT: vpsrlw S8, 32(%rdi), %ymm0
; CHECK-AVX512-NEXT: vpsrlw S8, (%rdi), %ymm1
; CHECK-AVX512-NEXT: vpackuswb %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT: vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-AVX512-NEXT: retq
; CHECK-VBMI-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-VBMI: # %bb.0:
; CHECK-VBMI-NEXT: vmovdqa (%rdi), %ymm1
; CHECK-VBMI-NEXT: vmovdqa {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-VBMI-NEXT: vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-VBMI-NEXT: retq
%a = load <32 x i16>, <32 x i16>* %x
%b = lshr <32 x i16> %a, <i16 32>
%c = trunc <32 x i16> %b to <32 x i8>
ret <32 x i8> %c
}

define <8 x i32> @trunc_v8i64_v8i32_sign(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i32_sign:
; CHECK: # %bb.0:
; CHECK-NEXT: vpsraq $48, 32(%rdi), %ymm1
; CHECK-NEXT: vpsraq $48, (%rdi), %ymm2
; CHECK-NEXT: vmovdqa {{.*#+}} ymm0 = [0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30]
; CHECK-NEXT: vpermi2w %ymm1, %ymm2, %ymm0
; CHECK-NEXT: retq
%a = load <8 x i64>, <8 x i64>* %x
%b = ashr <8 x i64> %a, <i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48>
%c = trunc <8 x i64> %b to <8 x i32>
ret <8 x i32> %c
}

define <16 x i16> @trunc_v16i32_v16i16_sign(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i16_sign:
; CHECK: # %bb.0:
; CHECK-NEXT: vmovdqa (%rdi), %ymm1
; CHECK-NEXT: vmovdqa {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31]
; CHECK-NEXT: vperm2w 32(%rdi), %ymm1, %ymm0
; CHECK-NEXT: retq
%a = load <16 x i32>, <16 x i32>* %x
%b = ashr <16 x i32> %a, <i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16>
%c = trunc <16 x i32> %b to <16 x i16>
ret <16 x i16> %c
}

define <32 x i8> @trunc_v32i16_v32i8_sign(<32 x i16>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-AVX512-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-AVX512: # %bb.0:
; CHECK-AVX512-NEXT: vpsraw $8, 32(%rdi), %ymm0
; CHECK-AVX512-NEXT: vpsraw $8, (%rdi), %ymm1
; CHECK-AVX512-NEXT: vpacksswb %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT: vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-AVX512-NEXT: retq
; CHECK-VBMI-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-VBMI: # %bb.0:
; CHECK-VBMI-NEXT: vmovdqa (%rdi), %ymm1
; CHECK-VBMI-NEXT: vmovdqa {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-VBMI-NEXT: vperm2b 32(%rdi), %ymm1, %ymm0
; CHECK-VBMI-NEXT: retq
%a = load <32 x i16>, <32 x i16>* %x
%b = ashr <32 x i16> %a, <i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8>
%c = trunc <32 x i16> %b to <32 x i8>
ret <32 x i8> %c
}

define void @zext_v16i8_v16i64(<16 x i8> %x, <16 x i64>* %y) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: zext_v16i8_v16i64:
; CHECK: # %bb.0:
; CHECK-NEXT: vpmovzxwb {{.*#+}} ymm1 = xmm0[0],zero,xmm0[1],zero,xmm0[2],zero,xmm0[3],zero,xmm0[4],zero,xmm0[5],zero,xmm0[6],zero,xmm0[7],zer
define void @sext_v16i8_v16i64(<16 x i8> %x, <16 x i64>* %y) nounwind "min-legal-vector-width"="256" {
  %a = zext <16 x i8> %x to <16 x i64>
  store <16 x i64> %a, <16 x i64>* %y
  ret void
}

define void @vselect_split_v8i16_setcc(<8 x i16> %s, <8 x i16> %t, <8 x i64>* %p, <8 x i64>* %q, <8 x i64>* %r)
%r) "min-legal-vector-width"="256" {  
; CHECK-LABEL: vselect_split_v8i16_setcc:  
; CHECK:   # %bb.0:  
; CHECK-NEXT: vmovdqa (%rsi), %ymm2  
; CHECK-NEXT: vmovdqa 32(%rsi), %ymm3  
; CHECK-NEXT: vpcmpeqw %xmm1, %xmm0, %k1  
; CHECK-NEXT: kshiftrb $4, %k1, %k2  
; CHECK-NEXT: vmovdqa64 32(%rdi), %ymm3 [%k2]  
; CHECK-NEXT: vmovdqa64 (%rdi), %ymm2 [%k1]  
; CHECK-NEXT: vmovdqa %ymm2, (%rdx)  
; CHECK-NEXT: vmovdqa %ymm3, 32(%rdx)  
; CHECK-NEXT: vzeroupper  
; CHECK-NEXT: retq  
%x = load <8 x i64>, <8 x i64>* %p  
%y = load <8 x i64>, <8 x i64>* %q  
%a = icmp eq <8 x i32> %s, %t  
%b = select <8 x i1> %a, <8 x i64> %x, <8 x i64> %y  
store <8 x i64> %b, <8 x i64>* %r  
ret void  
}  

define void @vselect_split_v8i32_setcc(<8 x i32> %s, <8 x i32> %t, <8 x i64>* %p, <8 x i64>* %q, <8 x i64>* %r) "min-legal-vector-width"="256" {  
; CHECK-LABEL: vselect_split_v8i32_setcc:  
; CHECK:   # %bb.0:  
; CHECK-NEXT: vmovdqa (%rsi), %ymm2  
; CHECK-NEXT: vmovdqa 32(%rsi), %ymm3  
; CHECK-NEXT: vpcmpeqd %ymm1, %ymm0, %k1  
; CHECK-NEXT: kshiftrb $4, %k1, %k2  
; CHECK-NEXT: vmovdqa64 32(%rdi), %ymm3 [%k2]  
; CHECK-NEXT: vmovdqa64 (%rdi), %ymm2 [%k1]  
; CHECK-NEXT: vmovdqa %ymm2, (%rdx)  
; CHECK-NEXT: vmovdqa %ymm3, 32(%rdx)  
; CHECK-NEXT: vzeroupper  
; CHECK-NEXT: retq  
%x = load <8 x i64>, <8 x i64>* %p  
%y = load <8 x i64>, <8 x i64>* %q  
%a = icmp eq <8 x i32> %s, %t  
%b = select <8 x i1> %a, <8 x i64> %x, <8 x i64> %y  
store <8 x i64> %b, <8 x i64>* %r  
ret void  
}  

define void @vselect_split_v16i8_setcc(<16 x i8> %s, <16 x i8> %t, <16 x i32>* %p, <16 x i32>* %q, <16 x i32>* %r) "min-legal-vector-width"="256" {  
; CHECK-LABEL: vselect_split_v16i8_setcc:  
; CHECK:   # %bb.0:  
; CHECK-NEXT: vmovdqa (%rsi), %ymm2
define void @vselect_split_v16i16_setcc(<16 x i16> %s, <16 x i16> %t, <16 x i32>* %p, <16 x i32>* %q, <16 x i32>* %r) "min-legal-vector-width"="256" {  
    ; CHECK-LABEL: vselect_split_v16i16_setcc:  
    ; CHECK:       # %bb.0:  
    ; CHECK-NEXT: vmovdqa (%rsi), %ymm2  
    ; CHECK-NEXT: vmovdqa %ymm1, %ymm0, %k1  
    ; CHECK-NEXT: kshiftrw $8, %k1, %k2  
    ; CHECK-NEXT: vmovdqa %ymm2, (%rdx)  
    ; CHECK-NEXT: vmovdqa %ymm3, 32(%rdx)  
    ; CHECK-NEXT: vzeroupper  
    ; CHECK-NEXT: retq  
    %x = load <16 x i32>, <16 x i32>* %p  
    %y = load <16 x i32>, <16 x i32>* %q  
    %a = icmp eq <16 x i16> %s, %t  
    %b = select <16 x i1> %a, <16 x i32> %x, <16 x i32> %y  
    store <16 x i32> %b, <16 x i32>* %r  
    ret void  
   }

define <16 x i8> @trunc_packus_v16i32_v16i8(<16 x i32>* %p) "min-legal-vector-width"="256" {  
    ; CHECK-LABEL: trunc_packus_v16i32_v16i8:  
    ; CHECK:       # %bb.0:  
    ; CHECK-NEXT: vmovdqa (%rsi), %ymm0  
    ; CHECK-NEXT: vpackusdw 32(%rdi), %ymm0, %ymm0  
    ; CHECK-NEXT: vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]  
    ; CHECK-NEXT: vpmovuswb %ymm0, %xmm0  
    ; CHECK-NEXT: vzeroupper  
    ; CHECK-NEXT: retq  
}

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%a = load <16 x i32>, <16 x i32>* %p
%b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
%c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
%d = icmp sgt <16 x i32> %c, zeroinitializer
%e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
%f = trunc <16 x i32> %e to <16 x i8>
ret <16 x i8>* %f
}

define void @trunc_packus_v16i32_v16i8_store(<16 x i32>* %p, <16 x i8>* %q) "min-legal-vector-width"="256" {
    %a = load <16 x i32>, <16 x i32>* %p
    %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
    %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
    %d = icmp sgt <16 x i32> %c, zeroinitializer
    %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
    %f = trunc <16 x i32> %e to <16 x i8>
    store <16 x i8> %f, <16 x i8>* %q
    ret void
}

define <64 x i1> @v64i1_argument_return(<64 x i1> %x) "min-legal-vector-width"="256" {
    %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
    %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
    %d = icmp sgt <16 x i32> %c, zeroinitializer
    %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
    %f = trunc <16 x i32> %e to <16 x i8>
    ret <64 x i1>* %x
}

define void @v64i1_shuffle(<64 x i8>* %x, <64 x i8>* %y) "min-legal-vector-width"="256" {
    %a = load <16 x i32>, <16 x i32>* %p
    %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
    %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
    %d = icmp sgt <16 x i32> %c, zeroinitializer
    %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
    %f = trunc <16 x i32> %e to <16 x i8>
    store <16 x i8> %f, <16 x i8>* %q
    ret void
}

define void @v64i1_shuffle(<64 x i8>* %x, <64 x i8>* %y) "min-legal-vector-width"="256" {
    %a = load <16 x i32>, <16 x i32>* %p
    %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
    %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
    %d = icmp sgt <16 x i32> %c, zeroinitializer
    %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
    %f = trunc <16 x i32> %e to <16 x i8>
    store <16 x i8> %f, <16 x i8>* %q
    ret void
}
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrq $63, %k0, %k2
; CHECK-NEXT:  kshiftrq $62, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-5, %rax
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrd $3, %k0, %k2
; CHECK-NEXT:  kshiftrq $63, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-9, %rax
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrd $2, %k0, %k2
; CHECK-NEXT:  kshiftrq $61, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-17, %rax
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrd $5, %k0, %k2
; CHECK-NEXT:  kshiftrq $60, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-33, %rax
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrd $7, %k0, %k2
; CHECK-NEXT:  kshiftrq $59, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-65, %rax
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrlq $63, %k0, %k2
; CHECK-NEXT:  kshiftrq $58, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-129, %rax
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrd $6, %k0, %k2
; CHECK-NEXT:  kshiftrq $57, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-257, %rax # imm = 0xFEFF
kmovq %rax, %k2
kandq %k2, %k1, %k1
kshiftrd $9, %k0, %k2
kshiftlq $63, %k2, %k2
kshiftrq $55, %k2, %k2
korq %k2, %k1, %k1
movq 5-513, %rax # imm = 0xFDFF
kmovq %rax, %k2
kandq %k2, %k1, %k1
kshiftrd $8, %k0, %k2
kshiftlq $63, %k2, %k2
kshiftrq $54, %k2, %k2
korq %k2, %k1, %k1
movq $-1025, %rax # imm = 0xFBFF
kmovq %rax, %k2
kandq %k2, %k1, %k1
kshiftrd $11, %k0, %k2
kshiftlq $63, %k2, %k2
kshiftrq $53, %k2, %k2
korq %k2, %k1, %k1
movq $-2049, %rax # imm = 0xF7FF
kmovq %rax, %k2
kandq %k2, %k1, %k1
kshiftrd $10, %k0, %k2
kshiftlq $63, %k2, %k2
kshiftrq $52, %k2, %k2
korq %k2, %k1, %k1
movq $-4097, %rax # imm = 0xEFFF
kmovq %rax, %k2
kandq %k2, %k1, %k1
kshiftrd $13, %k0, %k2
kshiftlq $63, %k2, %k2
kshiftrq $51, %k2, %k2
korq %k2, %k1, %k1
movq $-8193, %rax # imm = 0xDFFF
kmovq %rax, %k2
kandq %k2, %k1, %k1
kshiftrd $12, %k0, %k2
kshiftlq $63, %k2, %k2
kshiftrq $50, %k2, %k2
korq %k2, %k1, %k1
movq $-16385, %rax # imm = 0xBF0F
kmovq %rax, %k2
kandq %k2, %k1, %k1
kshiftrd $15, %k0, %k2
kshiftlq $63, %k2, %k2
kshiftrq $49, %k2, %k2
korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-32769, %rax # imm = 0xFFFF7FFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $14, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $48, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-65537, %rax # imm = 0xFFEFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $17, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $47, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-131073, %rax # imm = 0xFFFDFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $16, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $46, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-262145, %rax # imm = 0xFFBFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $19, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $45, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-524289, %rax # imm = 0xFF7FFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $18, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $44, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-1048577, %rax # imm = 0xFFEFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $21, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $43, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-2097153, %rax # imm = 0xFFFDFDFD
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $20, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $42, %k2, %k2
; CHECK-NEXT:  kshiftrq $35, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-536870913, %rax # imm = 0xFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrd $28, %k0, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $34, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movq $-1073741825, %rax # imm = 0xBFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k1
; CHECK-NEXT:  kshiftrd $31, %k0, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $33, %k2, %k2
; CHECK-NEXT:  korq %k2, %k1, %k1
; CHECK-NEXT:  movabsq $-2147483649, %rax # imm = 0xFFFFFFFF7FFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k2
; CHECK-NEXT:  vptestnmb %ymm0, %ymm0, %k1
; CHECK-NEXT:  kshiftrd $30, %k0, %k0
; CHECK-NEXT:  kshiftlq $63, %k0, %k0
; CHECK-NEXT:  kshiftrq $32, %k0, %k0
; CHECK-NEXT:  korq %k0, %k2, %k0
; CHECK-NEXT:  movabsq $-4294967297, %rax # imm = 0xFFFFFFFFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k1, %k2
; CHECK-NEXT:  kshiftrd $1, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $31, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-8589934593, %rax # imm = 0xFFFFFFFFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftld $3, %k1, %k2
; CHECK-NEXT:  kshiftrd $3, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $29, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-17179869185, %rax # imm = 0xFFFFFFFFBFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftld $2, %k1, %k2
; CHECK-NEXT:  kshiftrd $2, %k1, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftrd $16, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $14, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-1125899906842625, %rax # imm = 0xFFFBFFFFFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftrd $19, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $13, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-2251799813685249, %rax # imm = 0xFFF7FFFFFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftrd $18, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $12, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-4503599627370497, %rax # imm = 0xFFF7FFFFFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftrd $21, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $11, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-9007199254740993, %rax # imm = 0xFFDFFFFFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftrd $20, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $10, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-18014398509481985, %rax # imm = 0xFFBFFFFFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftrd $23, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $9, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-36028797018963969, %rax # imm = 0xFF7FFFFFFFFFFFFF
; CHECK-NEXT:  kmovq %rax, %k2
; CHECK-NEXT:  kandq %k2, %k0, %k0
; CHECK-NEXT:  kshiftrd $22, %k1, %k2
; CHECK-NEXT:  kshiftlq $63, %k2, %k2
; CHECK-NEXT:  kshiftrq $8, %k2, %k2
; CHECK-NEXT:  korq %k2, %k0, %k0
; CHECK-NEXT:  movabsq $-72057594037927937, %rax # imm = 0xFEFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $25, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $7, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-144115188075855873, %rax # imm = 0xFDFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $24, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $6, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-288230376151711745, %rax # imm = 0xFBFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $27, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $5, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-576460752303423489, %rax # imm = 0xF7FFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $26, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $4, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1152921504606846977, %rax # imm = 0xEFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $29, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $3, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2305843009213693953, %rax # imm = 0xBFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $31, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $2, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4611686018427387905, %rax # imm = 0xBFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $28, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $2, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-9223372036854775809, %rax # imm = 0xAFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $27, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $1, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-18446744073709551617, %rax # imm = 0xA7FFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $26, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq $0, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-36893488147419103235, %rax # imm = 0xA0FFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $29, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftq -$1, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-73786976294838206471, %rax # imm = 0xAFFFFFFFFFFF7FFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $30, %k1, %k2
; CHECK-NEXT:    kshiftlq $62, %k2, %k2
; CHECK-NEXT:    kshiftq -$2, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-14757395258967641294, %rax # imm = 0xA4FFFFFFEFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $31, %k1, %k2
; CHECK-NEXT:    kshiftlq $62, %k2, %k2
; CHECK-NEXT:    kshiftq -$3, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-29514790517935282588, %rax # imm = 0xA0000000030000000
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $28, %k1, %k2
; CHECK-NEXT:    kshiftlq $62, %k2, %k2
; CHECK-NEXT:    kshiftq -$4, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-59029581035870565176, %rax # imm = 0xB000000006000000
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshift $27, %k1, %k2
; CHECK-NEXT:    kshiftlq $62, %k2, %k2
; CHECK-NEXT:    kshiftq -$5, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
entry:
%a = load <64 x i8>, <64 x i8>* %x
%b = icmp eq <64 x i8> %a, zeroinitializer
%shuf = shufflevector <64 x i1> %b, <64 x i1> undef, <64 x i32> %i32 1, %i32 2, %i32 3, %i32 4, %i32 5, %i32 6, %i32 7, %i32 8, %i32 9, %i32 10, %i32 11, %i32 12, %i32 13, %i32 14, %i32 15, %i32 16, %i32 17, %i32 18, %i32 19, %i32 20, %i32 21, %i32 22, %i32 23, %i32 24, %i32 25, %i32 26, %i32 27, %i32 28, %i32 29, %i32 30, %i32 31, %i32 32, %i32 33, %i32 34, %i32 35, %i32 36, %i32 37, %i32 38, %i32 39, %i32 40, %i32 41, %i32 42, %i32 43, %i32 44, %i32 45, %i32 46, %i32 47, %i32 48, %i32 49, %i32 50, %i32 51, %i32 52, %i32 53, %i32 54, %i32 55, %i32 56, %i32 57, %i32 58, %i32 59, %i32 60, %i32 61, %i32 62, %i32 63, %i32 64>
call void @llvm.masked.store.v64i8.p0v64i8(<64 x i8> %a, <64 x i8>* %y, i32 %shuf)
ret void
}
declare void @llvm.masked.store.v64i8.p0v64i8(<64 x i8>, <64 x i8>* %shuf)
define i32 @v64i1_inline_asm() "min-legal-vector-width"="256" {
    # %bb.0:
    %1 = alloca i32, align 4
    %2 = load i64, i64* @mem64_src, align 8
    %3 = call i64 asm ",k,k,~{dirflag},~{fpsr},~{flags}"(i64 %2)
    store i64 %3, i64* @mem64_dst, align 8
    %4 = load i32, i32* %1, align 4
    ret i32 %4
}
define internal void @innerSmall() "min-legal-vector-width"="128" {
    ret void
}
define internal void @innerLarge() "min-legal-vector-width"="512" {
    ret void

define internal void @innerNoAttribute() {  
    ret void  
}

; We should not add an attribute during inlining. No attribute means unknown.  
; Inlining doesn't change the fact that we don't know anything about this  
; function.
define void @outerNoAttribute() {  
    call void @innerLarge()  
    ret void  
}

define void @outerConflictingAttributeSmall() "min-legal-vector-width"="128" {  
    call void @innerLarge()  
    ret void  
}

define void @outerConflictingAttributeLarge() "min-legal-vector-width"="512" {  
    call void @innerSmall()  
    ret void  
}

; We should remove the attribute after inlining since the callee's  
; vector width requirements are unknown.
define void @outerAttribute() "min-legal-vector-width"="128" {  
    call void @innerNoAttribute()  
    ret void  
}

; CHECK: define void @outerNoAttribute() {
; CHECK: define void @outerConflictingAttributeSmall() #0
; CHECK: define void @outerConflictingAttributeLarge() #0
; CHECK: define void @outerAttribute() {
; CHECK: attributes #0 = { "min-legal-vector-width"="512" }

1.24 jansson 2.11

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