CUAC Integration with Microsoft AD

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Contents

Introduction

This document describes the way in which Lightweight Directory Access Protocol (LDAP) works between the Cisco Unified Attendant Console (CUAC) and the Microsoft Active Directory (AD) and the procedures that are used in order to integrate the two systems.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- CUCM
- CUAC
- LDAP
- AD

Components Used

The information in this document is based on the CUAC Version 10.x.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Background Information

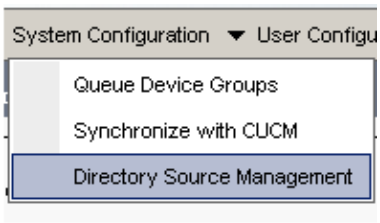
In earlier CUAC versions, the server obtains users directly from the Cisco Unified Communications Manager (CUCM) via predefined queries and filters. With the CUAC Premium Edition (CUACPE), administrators are allowed to integrate and import users directly from the AD. This grants flexibility to administrators for the implementation of attributes and filters of their own choice and requirements.

Note: The CUACPE has now been replaced with the CUAC Advanced Edition for Versions 10 and later.

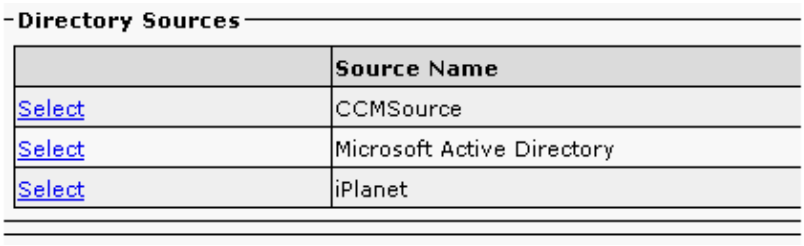
Integrate AD with CUAC and Import Users from AD

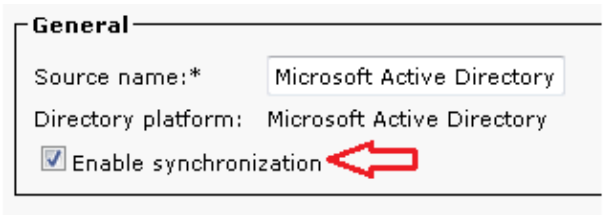
Complete these steps in order to integrate the CUAC with the AD and import users from the AD:

1. Enable Directory Synchronization for AD on the CUAC.

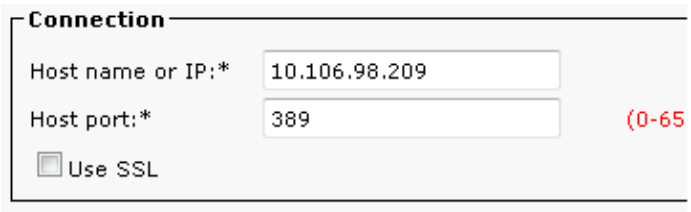


2. Select ***Microsoft Active Directory*** and check the ***Enable synchronization*** check box:

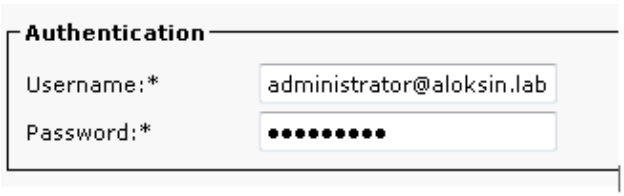




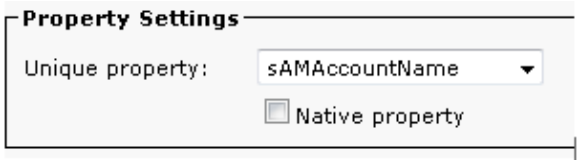
3. Input the configuration details for the Active Directory Server:



For this example, ***administrator@aloksin.lab*** is used for authentication:



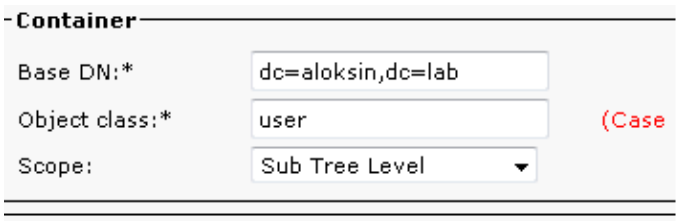
4. In the Property Settings section, enter the configuration details for the Unique property, which appears once you enter the other details and click ***Save***.



Note: This is a unique value for each entry in the AD. If there are duplicate values, the CUAC pulls only one entry.

5. In the Container section, enter the configuration details for the Base DN, which is the user search scope in the AD.

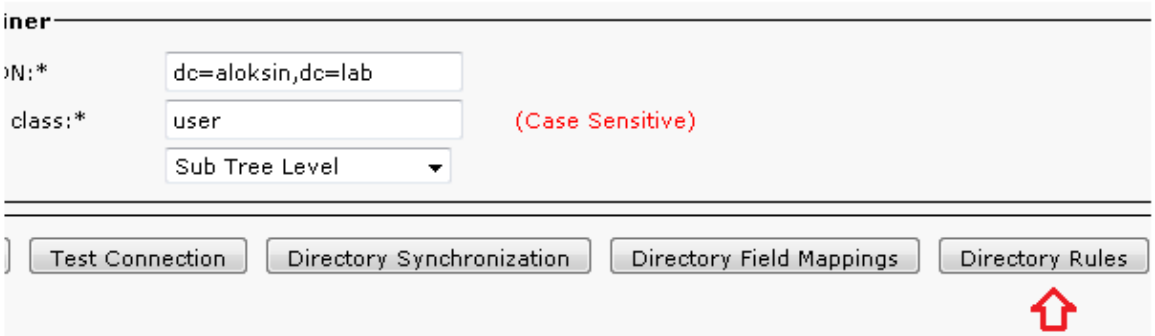
   The *Object class* field is used by the AD in order to determine the requested search scope. By default, it is set to *contact*, which means that the AD looks for *contacts* (not users) in the requested search base. In order to import *users* on the CUAC, change the Object class setting to ***user***:



6. Save the settings, click ***Directory Field mappings***, and configure all of the attributes that you would like to import for any user. Here is the configuration that is used in this example:

Source Fields	Destination Fields	Defaul
telephoneNumber	Extension	
mail	Email	
givenName	First Name	
sn	Last Name	

7. Navigate to the Directory source page and click ***Directory Rules***:

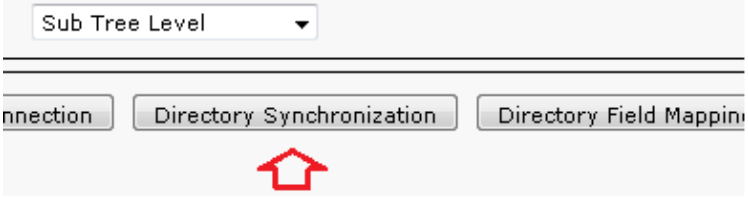


8. Click ***Add New*** and create a rule. When you add a directory rule, a rule filter appears by default.

	Field	Operator	Value
	telephoneNumber	=	*

Note: There is no need to change the rule filter. It imports all of the users that have a telephone number configured.

9. In order to configure auto−sync with the AD, click the ***Directory Synchronization*** tab.



10. The configuration is now complete. Navigate to ***Engineering*** > ***Service Management*** and restart the LDAP plugin in order to start the sync manually.

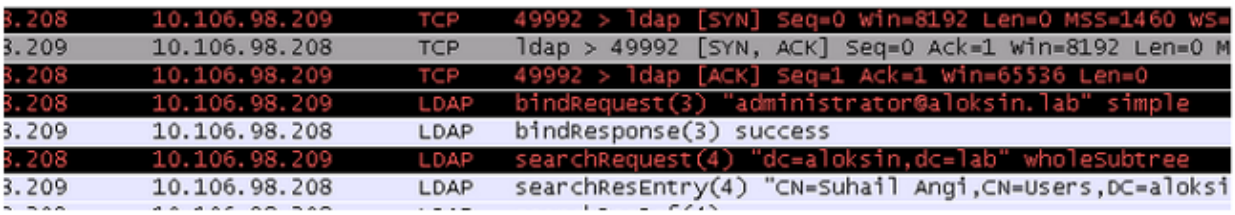
LDAP Functionality Between CUAC and AD

LDAP Process Summary

Here is a summary of the LDAP process between the CUAC and the AD:

1. A TCP session is established between the two servers (CUAC and AD).
2. The CUAC sends a BIND request to the AD and authenticates via the user that is configured in the Authentication settings.
3. Once the AD successfully authenticates the user, it sends a BIND Success notification to the CUACPE.
4. The CUAC sends a SEARCH request to the AD, which has the search scope information, filters for the search, and attributes for any filtered user.
5. The AD scans for the requested object (configured in the Object Class settings) in the search base. It filters out objects that match the criteria (filter) detailed in the SEARCH request message.
6. The AD responds to the CUAC with the search results.

Here is a sniffer capture that illustrates these steps:

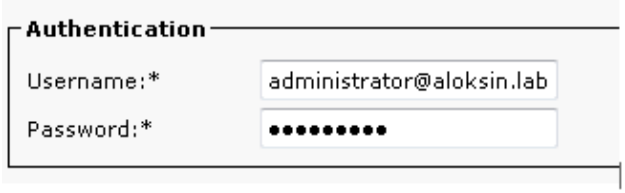


LDAP Process Details

Once the configuration on the CUAC is completed and the LDAP plugin is restarted, the CUAC server sets up a TCP session with the AD.

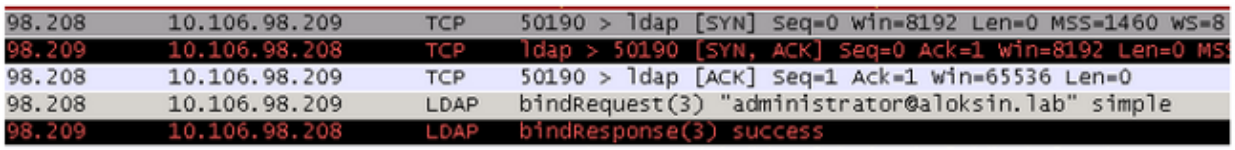
The CUAC then sends a BIND request in order to authenticate with the AD server. If the authentication is successful, the AD sends a BIND Success response to the CUAC. With this, both servers attempt to set up a session on port 389 in order to sync users and their information.

Here is the configuration on the server that defines the Distinguished name, which is used for authentication in the BIND transaction:

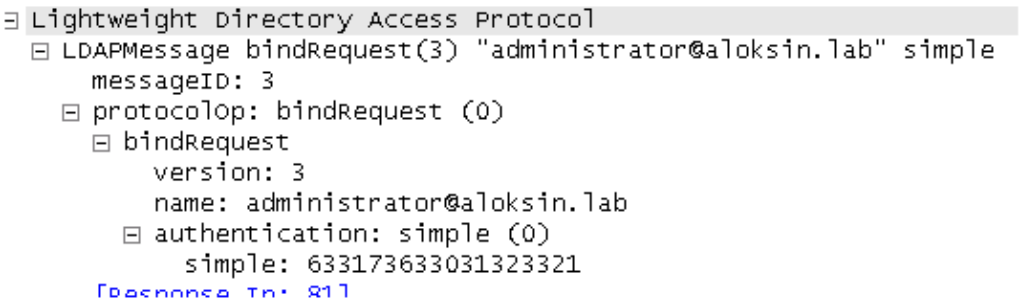


These messages appear in the packet captures:

- Here is the TCP handshake, followed by the BIND request:



- Here is the expansion of the BIND request:



- Here is the expansion of BIND response, which indicates successful authentication of the user (***administrator*** in this example):

Upon a successful bind, the server sends a SEARCH request to the AD in order to import users. This SEARCH request contains the filter and attributes that are used by the AD. The AD then searches for users within the defined search base (as detailed in the SEARCH request message), which fulfills the criteria in the filter and the attributes verification.

Here is an example of the SEARCH request that is sent by the CUCM:

```
Lightweight Directory Access Protocol
     LDAPMessage searchRequest(2) "dc=aloksin,dc=lab" wholeSubtree
         messageID: 2
         protocolOp: searchRequest (3)
             searchRequest
                 baseObject: dc=aloksin,dc=lab
                 scope: wholeSubtree (2)
                 derefAliases: derefAlways (3)
```

```
            sizeLimit: 0
            timeLimit: 0
            typesOnly: False
            Filter: (&(&(objectclass=user)(!(objectclass=Computer)))
             (!(UserAccountControl:1.2.840.113556.1.4.803:=2)))
                filter: and (0)
                    and: (&(&(objectclass=user)(!(objectclass=Computer)))
                     (!(UserAccountControl:1.2.840.113556.1.4.803:=2)))
                        and: 3 items
                            Filter: (objectclass=user)
                                and item: equalityMatch (3)
                                    equalityMatch
                                        attributeDesc: objectclass
                                        assertionValue: user
                            Filter: (!(objectclass=Computer))
                                and item: not (2)
                                    Filter: (objectclass=Computer)
                                        not: equalityMatch (3)
                                            equalityMatch
                                                attributeDesc: objectclass
                                                assertionValue: Computer
                            Filter: (!(UserAccountControl:1.2.840.113556.1.4.
                             803:=2))
                                and item: not (2)
                                    Filter: (UserAccountControl:1.2.840.113556
                                     .1.4.803:=2)
                                        not: extensibleMatch (9)
                                            extensibleMatch UserAccountControl
                                                matchingRule: 1.2.840.113556.
                                                 1.4.803
                                                type: UserAccountControl
                                                matchValue: 2
                                                dnAttributes: False
            attributes: 15 items
                AttributeDescription: objectguid
                AttributeDescription: samaccountname
                AttributeDescription: givenname
                AttributeDescription: middlename
                AttributeDescription: sn
                AttributeDescription: manager
                AttributeDescription: department
                AttributeDescription: telephonenumber
                AttributeDescription: mail
                AttributeDescription: title
                AttributeDescription: homephone
                AttributeDescription: mobile
                AttributeDescription: pager
                AttributeDescription: msrtcsip-primaryuseraddress
                AttributeDescription: msrtcsip-primaryuseraddress
    [Response In: 103]
    controls: 1 item
        Control
            controlType: 1.2.840.113556.1.4.319 (pagedResultsControl)
            criticality: True
            SearchControlValue
                size: 250
                cookie: <MISSING>
```

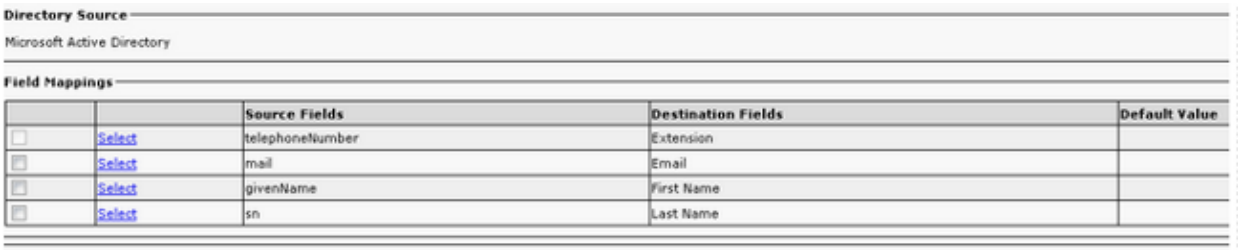
When the AD receives this request from the CUCM, it searches for users in the ***baseObject: dc=aloksin,dc=lab***, which satisfies the filter. Any user who does not fulfill the requirements that are detailed by the filter is left out. The AD responds to the CUCM with all of the filtered users and sends the values for the requested attributes.

Note: Objects cannot be imported. Only *users* are imported. This is because the filter that is sent in the

SEARCH request message includes ***objectclass=user***. Hence, the AD searches only for users, not contacts. The CUCM has all of these mappings and a filter by default.

The CUAC is not configured by default; there are no mapping details configured in order to import attributes for users, so you must input these details manually. In order to create these mappings, navigate to ***System Configuration > Directory Source Management > Active Directory > Directory Field Mapping***.

Administrators are allowed to map fields per their own requirements. Here is an example:



Directory Source

Microsoft Active Directory

Field Mappings

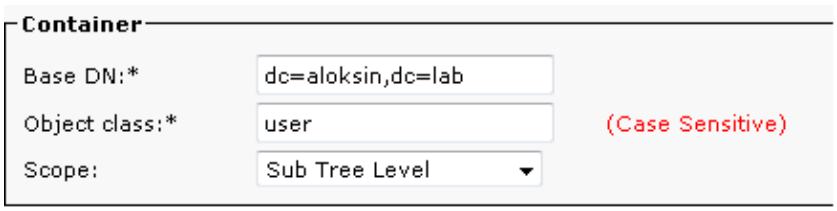
		Source Fields	Destination Fields	Default Value
☐	Select	telephoneNumber	Extension	
☐	Select	mail	Email	
☐	Select	givenName	First Name	
☐	Select	sn	Last Name	

The Source Field information is sent to the AD in the SEARCH request message. When the AD sends the SEARCH response message, these values are stored in the Destination Fields on the CUACPE.

Note that the CUAC by default has the Object Class set to *contacts*. If this default setting is used, the filter that is sent to the AD appears as shown here:

```
Filter: (&(&(objectclass=contact)(  ............
```

With this filter, the AD never returns any users to the CUACPE, since it searches for *contacts* in the search base, not *users*. For this reason, you must change Object Class to ***user***:



Container

Base DN:* dc=aloksin,dc=lab

Object class:* user (Case Sensitive)

Scope: Sub Tree Level

Up to this point, these settings have been configured on the CUAC:

- Connections details
- Authentication (distinguished user for binding)
- Container settings
- Directory mapping

In this example, the Unique property is configured as ***sAMAccountName***. If you restart the LDAP plugin on the CUAC and check the SEARCH request message, it contains no attributes or filter except the ***ObjectClass=user***:

```
Lightweight Directory Access Protocol
    LDAPMessage searchRequest(224) "dc=aloksin,dc=lab" wholeSubtree
        messageID: 224
        protocolOp: searchRequest (3)
            searchRequest
                baseObject: dc=aloksin,dc=lab
                scope: wholeSubtree (2)
                derefAliases: neverDerefAliases (0)
                sizeLimit: 1
                timeLimit: 0
                typesOnly: True
```

```
            Filter: (ObjectClass=user)
                filter: equalityMatch (3)
                    equalityMatch
                        attributeDesc: ObjectClass
                        assertionValue: user
            attributes: 0 items
        [Response In: 43]
```

Note that the Directory rule is missing here. In order to sync the contacts with the AD, you must create a rule. By default, there is no Directory rule configured. As soon as one is created, a filter is already present. There is no need to change the filter, as you must import all of the users that have a telephone number.

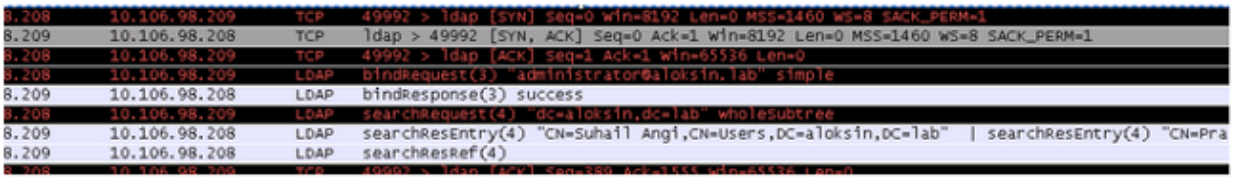
Field	Operator	Val
telephoneNumber	=	*

Restart the LDAP plugin in order to initiate a sync with the AD and import the users. Here is the SEARCH request from the CUAC:

```
Lightweight Directory Access Protocol
    LDAPMessage searchRequest(4) "dc=aloksin,dc=lab" wholeSubtree
        messageID: 4
        protocolOp: searchRequest (3)
            searchRequest
                baseObject: dc=aloksin,dc=lab
                scope: wholeSubtree (2)
                derefAliases: neverDerefAliases (0)
                sizeLimit: 0
                timeLimit: 15
                typesOnly: False
                Filter: (&(&(objectclass=user)(telephoneNumber=*))
                 (!(UserAccountControl:1.2.840.113556.1.4.803:=2)))
                    filter: and (0)
                        and: (&(&(objectclass=user)(telephoneNumber=*))
                         (!(UserAccountControl:1.2.840.113556.1.4.803:=2)))
                            and: 3 items
                                Filter: (objectclass=user)
                                    and item: equalityMatch (3)
                                        equalityMatch
                                            attributeDesc: objectclass
                                            assertionValue: user
                                Filter: (telephoneNumber=*)
                                    and item: present (7)
                                        present: telephoneNumber
                                Filter: (!(UserAccountControl:1.2.840.113556.
                                 1.4.803:=2))
                                    and item: not (2)
                                        Filter: (UserAccountControl:1.2.840.113556.
                                         1.4.803:=2)
                                            not: extensibleMatch (9)
                                                extensibleMatch UserAccountControl
                                                    matchingRule: 1.2.840.113556.1.
                                                     4.803
                                                    type: UserAccountControl
                                                    matchValue: 2
                                                    dnAttributes: False
                 attributes: 10 items
                    AttributeDescription: TELEPHONENUMBER
                    AttributeDescription: MAIL
                    AttributeDescription: GIVENNAME
                    AttributeDescription: SN
                    AttributeDescription: sAMAccountName
                    AttributeDescription: ObjectClass
                    AttributeDescription: whenCreated
                    AttributeDescription: whenChanged
```

```
                AttributeDescription: uSNCreated
                AttributeDescription: uSNChanged
        [Response In: 11405]
        controls: 1 item
            Control
                controlType: 1.2.840.113556.1.4.319 (pagedResultsControl)
                SearchControlValue
                    size: 500
                    cookie: <MISSING>
```

If the AD finds users that match the criteria detailed in the SEARCH request message, then it sends a *SearchResEntry* message that contains the user information.



Here is the SearchResEntry message:

```
Lightweight Directory Access Protocol
    LDAPMessage searchResEntry(4) "CN=Suhail Angi,CN=Users,DC=aloksin,DC=lab" [4 results]
        messageID: 4
        protocolOp: searchResEntry (4)
            searchResEntry
                objectName: CN=Suhail Angi,CN=Users,DC=aloksin,DC=lab
                attributes: 9 items
                    PartialAttributeList item objectClass
                        type: objectClass
                        vals: 4 items
                            top
                            person
                            organizationalPerson
                            user
                    PartialAttributeList item sn
                        type: sn
                        vals: 1 item
                            Angi
                    PartialAttributeList item telephoneNumber
                        type: telephoneNumber
                        vals: 1 item
                            1002
                    PartialAttributeList item givenName
                        type: givenName
                        vals: 1 item
                            Suhail
                    PartialAttributeList item whenCreated
                        type: whenCreated
                        vals: 1 item
                            20131222000850.0Z
                    PartialAttributeList item whenChanged
                        type: whenChanged
                        vals: 1 item
                            20131222023413.0Z
                    PartialAttributeList item uSNCreated
                        type: uSNCreated
                        vals: 1 item
                            12802
                    PartialAttributeList item uSNChanged
                        type: uSNChanged
                        vals: 1 item
                            12843
```

```
                    PartialAttributeList item sAMAccountName
                        type: sAMAccountName
                        vals: 1 item
                            sangi
        [Response To: 11404]
        [Time: 0.001565000 seconds]
Lightweight Directory Access Protocol
    LDAPMessage searchResEntry(4) "CN=Pragathi NS,CN=Users,DC=aloksin,DC=lab" [5 results]
        messageID: 4
        protocolOp: searchResEntry (4)
            searchResEntry
                objectName: CN=Pragathi NS,CN=Users,DC=aloksin,DC=lab
                attributes: 9 items
                    PartialAttributeList item objectClass
                        type: objectClass
                        vals: 4 items
                            top
                            person
                            organizationalPerson
                            user
                    PartialAttributeList item sn
                        type: sn
                        vals: 1 item
                            NS
                    PartialAttributeList item telephoneNumber
                        type: telephoneNumber
                        vals: 1 item
                            1000
                           .......
                           ....{message truncated}.........
                           .....
```

Note: There is no MAIL in the response, even though this attribute is requested. This is because the MAIL ID was not configured for users on the AD.

Once these values are received by the CUAC, it stores them in the Structured Query Language (SQL) table. You can then log into the console, and the console fetches the users list from this SQL table on CUACPE server.

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