Use Cases Specification

for

<Taxonomic Hierarchy Comparator>

Version 0.1.0

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Table of Contents

Revision History

Name	Date	Reason For Changes	Version

1. Introduction

1.1 Purpose

This document includes all the possible use cases for THC to describe the interaction between users and the tool. It is an important part of Software Requirements Specification.

1.2 Intended Audience and Reading Suggestions

Developers and testers are the intended audiences. All the sections should be read in detail by both two groups of audiences.

1.3 Conventions

Taxonomic Hierarchy: TH
Taxonomic Hierarchy=Taxonomic Tree

1.4 Project Scope

Taxonomic Hierarchy Comparator is intended for analyzing various biological taxonomic hierarchies from different sources. The targets of the project are as follows:

a. Propose a reliable method for comparing taxonomic hierarchies.
b. Implement a mature tool basing on comparison method for classifications comparison and visualization.
c. Find out the differences among classifications provided by EOL or from other sources, and propose quantitative indexes for measuring the degree of overlap and congruence among them.
d. Try to explore a possible method for taxonomists to mine differences of taxonomic views and find out potential taxonomic or nomenclatural acts.

2. User Cases for THC

2.1 User Management

User management is a group of functions required and related to users including registration, edit profile, log in, log out and authorization (Fig 1).

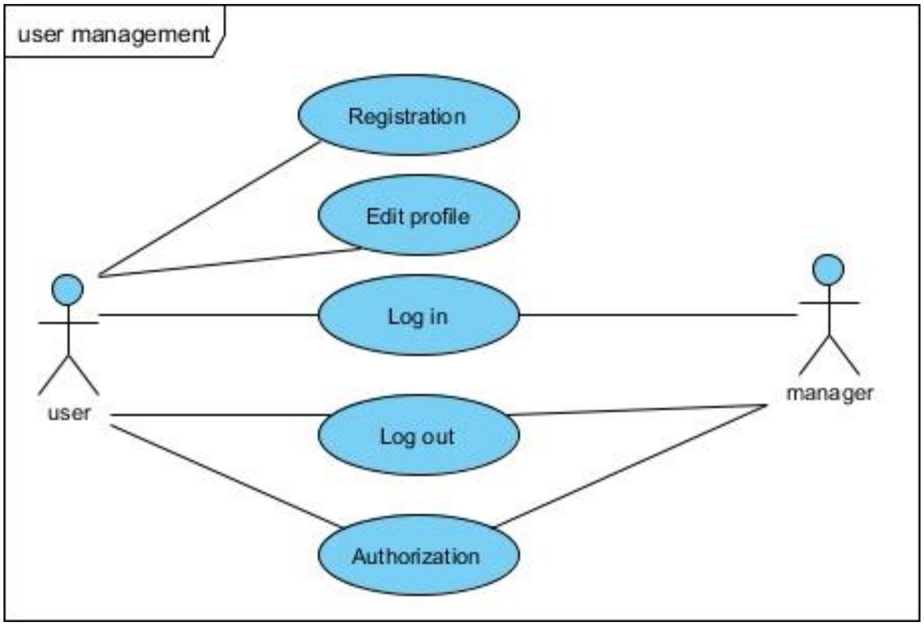
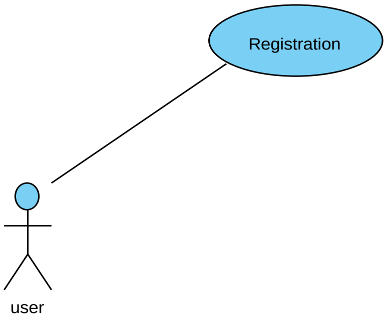


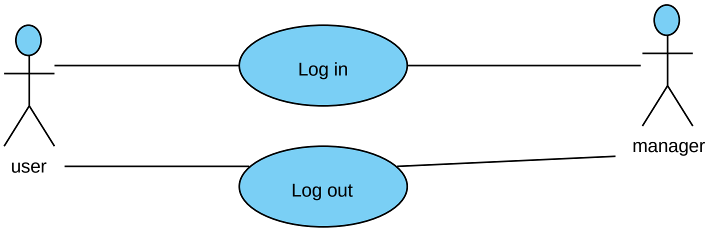
Fig1. Over view of User Management

2.1.1 Registration

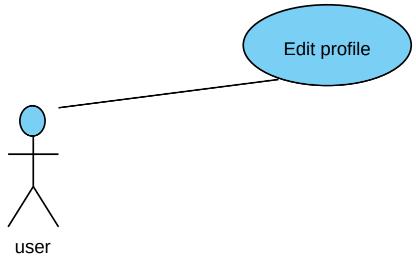
Use Case Name	Registration
Use Case ID	UC-THC-REGISTRATION-01
Brief Description	To be a user of THC, registration is required.
Actors	Custom Users
Flow of Even	➢ Basic Flow: 1. Visit the web site of THC 2. Enter the registration page 3. Fill the form of profile 4. Submit the form 5. Validate the information 6. Register successfully 7. Case finishes ➢ Exception Flow: 1. Candidate users do not provide information required. The tool alerts the exception and turn to step 3 in basic flow or cancel registration to finish the case. 2. Information like e-mail is invalid. The tool alerts the exception and turn to step 3 in basic flow or cancel registration to finish the case..
Special Requirements	➢ Functional Requirements: 1. Text value validation
Preconditions	Visit the THC home page successfully
Post-conditions	Register successfully and turn to log in page.
Extension Point	None

Diagram	

2.1.2 Log In & Log Out

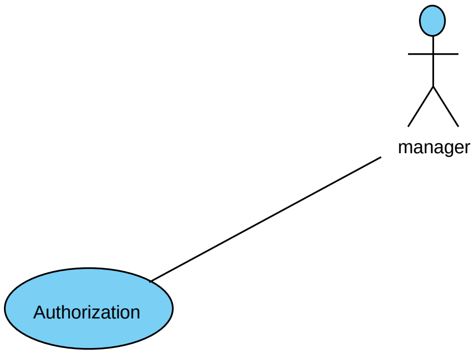
Use Case Name	Log In &Log Out
Use Case ID	UC-THC-Log-02
Brief Description	To use the full functions of THC, log in is required. User should provide the correct username and password. After log in successfully, user can visit all available pages and resources.
Actors	Users &manager
Flow of Even	➢ Basic Flow: 1. Visit the log in page 2. Fill the fields of username, password and other required information 3. Submit the information 4. Validate the information 5. Log in successfully and turn to homepage. 6. log out 7. Case finishes ➢ Exception Flow: 1. The username or password is invalid, the tool alert the exception, and turn to step 2 in "Basic Flow", or give up log in to end the case.
Special Requirements	➢ Functional Requirements: 1. Automatically remember the user and password ➢ Nonfunctional Requirements: Validation of users and the response time should less than 3s.
Preconditions	Visit the THC home page successfully
Post-conditions	Log in successfully and the resources are available Log out then turn to log in page
Extension Point	None
Diagram	

2.1.3 Edit Profile

Use Case Name	Edit Profile
Use Case ID	UC-THC-Profile-03
Brief Description	Users log in the tool and then can complete or update their profile.
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for editing profile 3. Fill the fields to be completed or updated and then submit 4. Validate the value of these fields 5. Update the profile successfully and response back the message 6. Finish the case ➢ Exception Flow: The value of the fields is invalid. The tool throws the exception and then turn to the “Basic Flow” step 3, or give up to update profile and finishes the case.
Special Requirements	None
Preconditions	Log in THC successfully
Post-conditions	Log in successfully and the profile page is available for updating
Extension Point	None
Diagram	

2.1.4 Authorization

Use Case Name	Authorization
Use Case ID	UC-THC- Authorization -04
Brief Description	Managers authorize the common users the power to use THC.
Actors	Manager

Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for authorization 3. Check out the qualify of the user 4. Give power to the registered user 5. Give message to the user 6. Finish the case ➢ Exception Flow: The user is regarded unqualified, then send email to the user asking for more materials.
Special Requirements	None
Preconditions	Log in THC successfully
Post-conditions	Activate the user account and send the message to user.
Extension Point	None
Diagram	

2.2 Use Cases for Taxonomic Hierarchy (Tree) Management

This section is about Managing taxonomic hierarchies including building trees update trees, share trees and so on (Fig2).

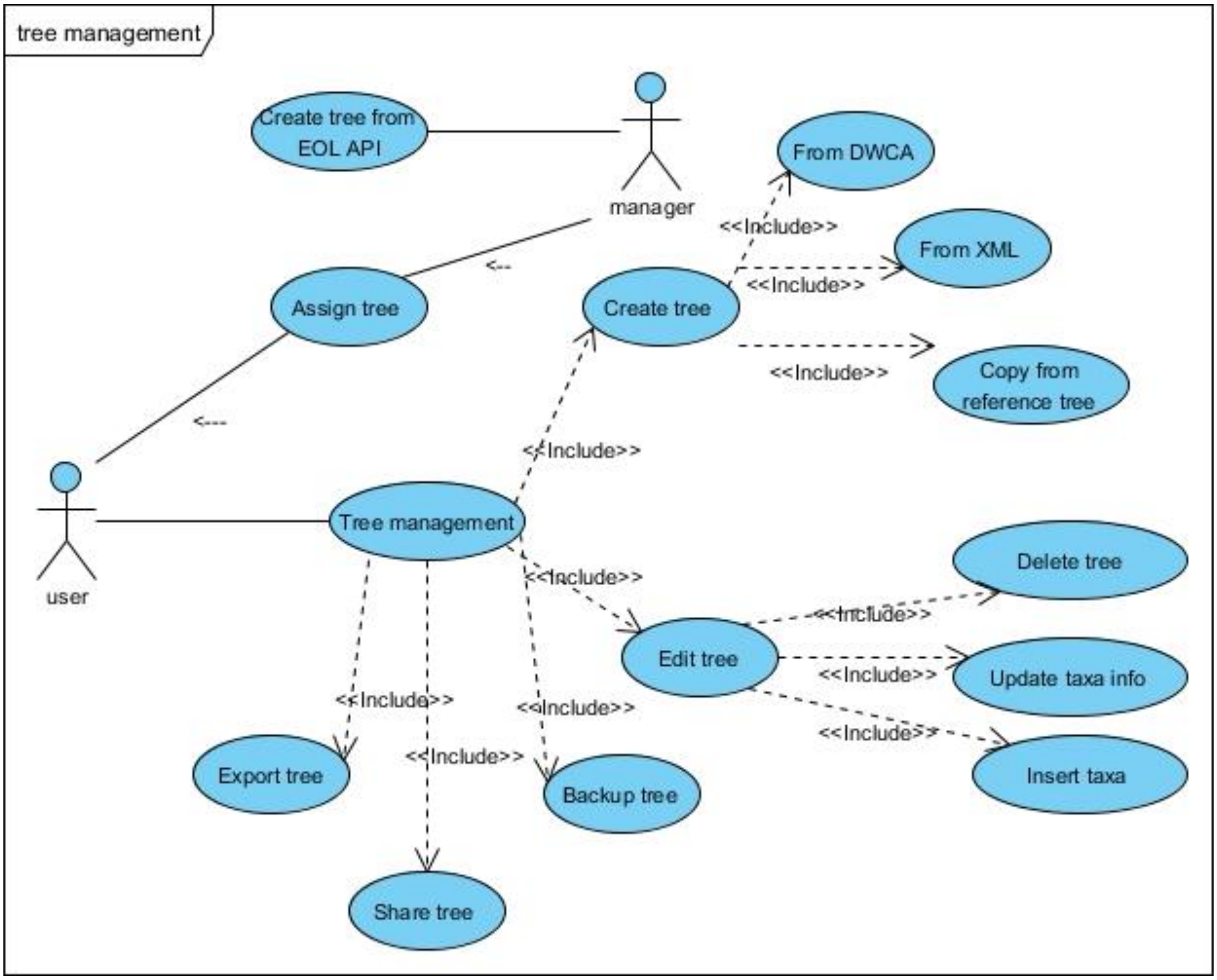
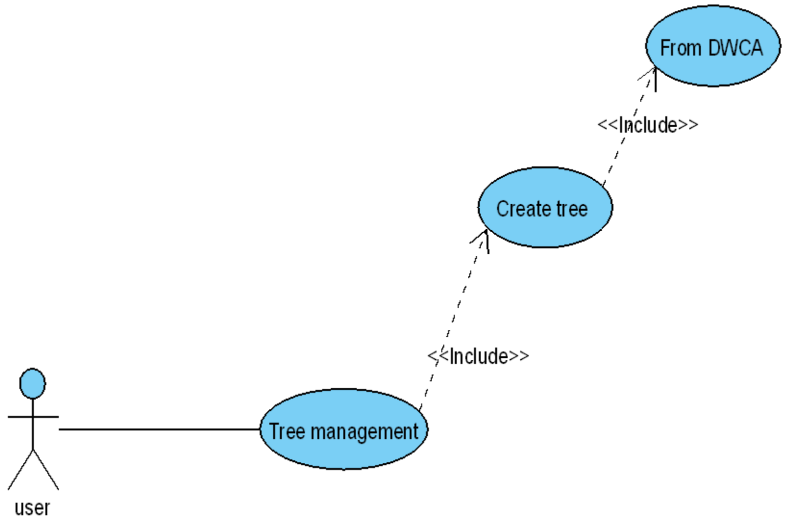


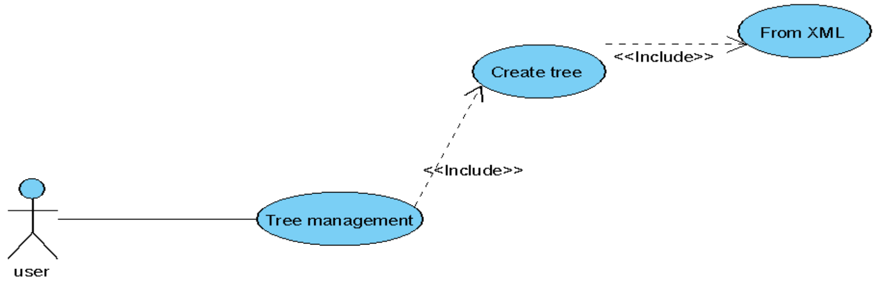
Figure2 use cases for tree management

2.2.1 Create Tree (TH) from DWCA

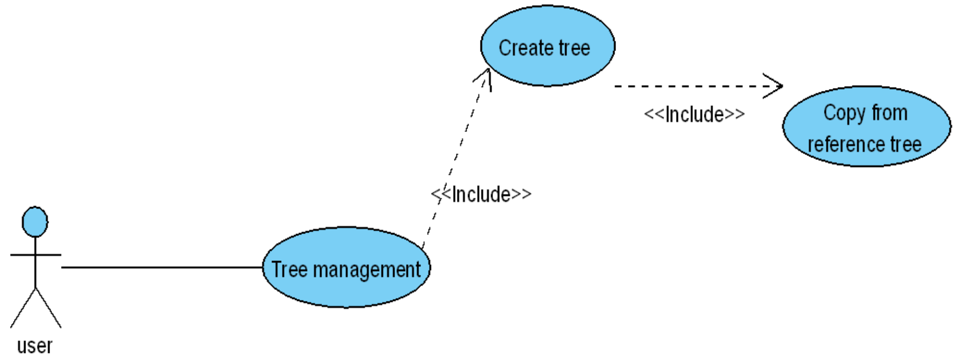
Use Case Name	Create Tree from DWCA
Use Case ID	UC-THC-CreateTreeDWCA-05
Brief Description	Users log in the tool and then can create trees from DWCA file
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for building trees 3. Give names, DWCA file path and other required information to the new tree. 4. Validate the DWCA file and Upload to server responding back a link. 5. Read the DWCA file and process the data to build a tree 6. Create successfully and Finish the case ➢ Exception Flow: 1. The value of the fields required is invalid. The tool throws the exception and then turns to the "Basic Flow" step 3, or give up to create tree and finishes the case. 2. The DWCA file is invalid, and the tool fail to build a tree. Turn to

	"Basic Flow" step 3, or give up action to the case.
Special Requirements	➢ Functional Requirements: Build tree is a time consuming process, and the script should be allowed to run for enough time.
Preconditions	Log in THC successfully and the function is available to the user
Post-conditions	Build tree successfully and user can use it for other use.
Extension Point	None
Diagram	 From DWCA <<Include>> Create tree <<Include>> Tree management user

2.2.2 Create Tree (TH) from xml in BSBC

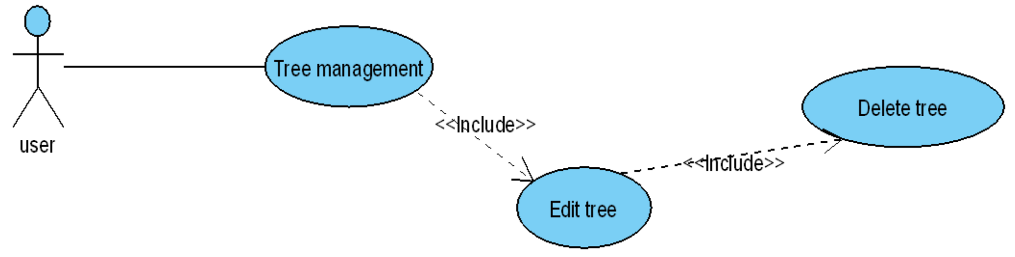
Use Case Name	Create Tree from BSBC xml file
Use Case ID	UC-THC-CreateTreeBSBC-06
Brief Description	Users log in the tool and then can create trees from BSBC xml file
Actors	Users
Flow of Even	Similar to 2.2.1
Special Requirements	Similar to 2.2.1
Preconditions	Similar to 2.2.1
Post-conditions	Similar to 2.2.1
Extension Point	None
Diagram	 From XML <<Include>> Create tree <<Include>> Tree management user

2.2.3 Create Tree by Copying Shared Tree

Use Case Name	Create Tree by Copy
Use Case ID	UC-THC-CreateTreeCopy-07
Brief Description	Users log in the tool and then can create trees by copying branches of trees in shared tree pool.
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for building trees 3. Select tree and the branches to be copied. 4. Give names and other required information to the new tree. 5. Execute the process 6. Create successfully and Finish the case ➢ Exception Flow: 1. The value of the fields required is invalid. The tool throws the exception and then turns to the "Basic Flow" step 4, or give up to create tree and finish the case. 2. The reference tree is not selected. Turn to step3 of Basic Flow, or give up directly and finish the case.
Special Requirements	➢ Functional Requirements: Build tree is a time consuming process, and the script should be allowed to run for enough time.
Preconditions	Log in THC successfully and the function is available to the user
Post-conditions	Build tree successfully and user can use it for other use.
Extension Point	None
Diagram	 Create tree <<Include>> Copy from reference tree <<Include>> Tree management user

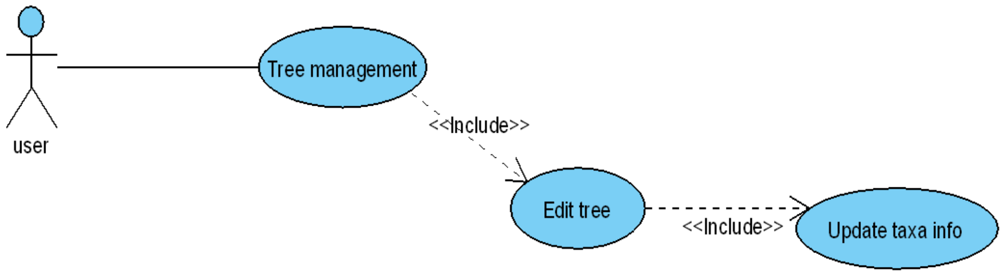
2.2.4 Delete Tree

Use Case Name	Delete Tree
Use Case ID	UC-THC-DeleteTree -08
Brief Description	Users log in the tool and then select the tree to be deleted. Do delete and the tree will be removed from database permanently.
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing trees 3. Select the tree to be deleted. 4. Delete the tree and waiting response.

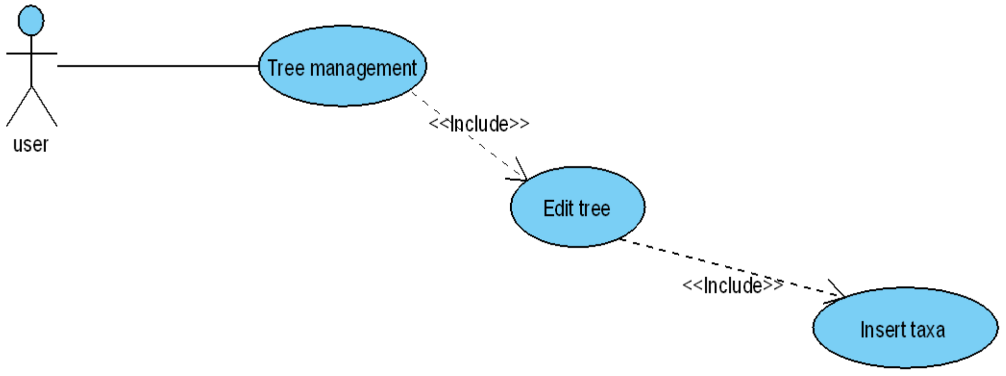
	5. delete successfully and Finish the case ➢ Exception Flow: 1. The tree to be deleted is not selected. The tool throws the exception. Turn to the "Basic Flow" step 4, or give up directly and finish the case. 2. The reference tree is not selected. Turn to step3 of Basic Flow, or give up directly and finish the case.
Special Requirements	➢ Functional Requirements: Delete tree is a time consuming process, and the script should be allowed to run for enough time.
Preconditions	Log in THC successfully and the function is available to the user
Post-conditions	Delete tree successfully and the tree cannot be used any more.
Extension Point	None
Diagram	 user Tree management <<Include>> Delete tree <<Include>> Edit tree

2.2.5 Update Tree

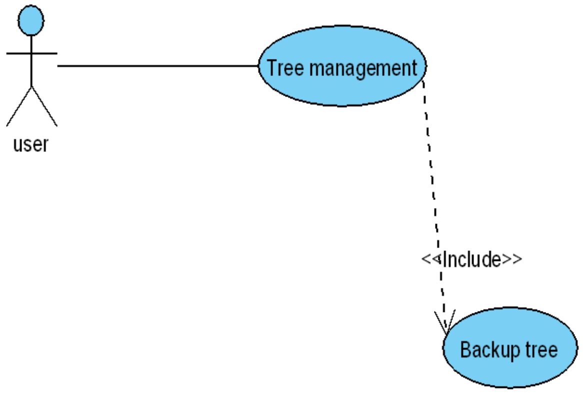
Use Case Name	Update Tree
Use Case ID	UC-THC- UpdateTree -09
Brief Description	Users log in the tool and then select the tree to be update. Edit the taxa in the tree including names, rank and position.
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing trees 3. Select the tree to be updated. 4. Edit the taxa information including names, rank and position. 5. Save the change and Finish the case ➢ Exception Flow: 1. The tree to be edited is not selected. The tool throws the exception. Turn to the "Basic Flow" step 3, or give up directly and finish the case. 2. The information for updating is invalid. Turn to the "Basic Flow" step 4, or give up directly and finish the case.
Special Requirements	None
Preconditions	Log in THC successfully and go to the tree editor page
Post-conditions	Update successfully and the tree can be used for analysis.
Extension Point	None

Diagram	 user Tree management <<Include>> Edit tree <<Include>> Update taxa info

2.2.6 Add New Taxa

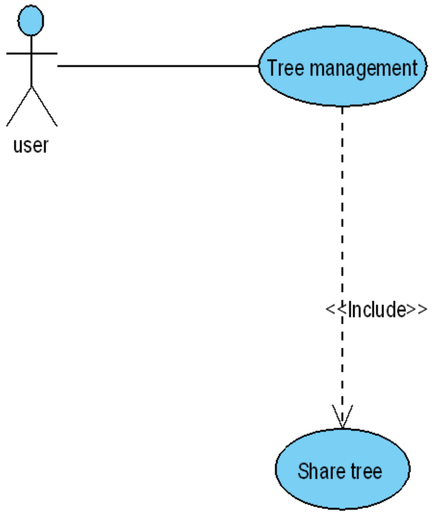
Use Case Name	Add New Taxa
Use Case ID	UC-THC- NewTaxa -10
Brief Description	Users log in the tool and then select the tree to add new taxa. Provide information like names, rank and position, and save the taxa to the tree.
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing trees 3. Select the tree to add new taxa. 4. Fill the taxa information including names, rank and position. 5. Save the new taxa and Finish the case ➢ Exception Flow: 1. The tree to be updated is not selected. The tool throws the exception. Turn to the "Basic Flow" step 3, or give up directly and finish the case. 2. The information for taxa is invalid. Turn to the "Basic Flow" step 4, or give up directly and finish the case.
Special Requirements	None
Preconditions	Log in THC successfully and go to the tree editor page
Post-conditions	Save new taxa successfully and they present in the target tree. The tree can be used for analysis.
Extension Point	None
Diagram	 user Tree management <<Include>> Edit tree <<Include>> Insert taxa

2.2.7 Backup Tree

Use Case Name	Backup Tree
Use Case ID	UC-THC- BackupTree -11
Brief Description	Users log in the tool and then select the tree to be backup. It is just like create a tree by copying an exist tree. It can keep the original tree reserved and the new copy be modified.
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing trees 3. Select the tree to be backup. 4. Provide the copy's detail information. 5. Save the copy and Finish the case ➢ Exception Flow: 3. The tree to be backup is not selected. The tool throws the exception. Turn to the "Basic Flow" step 3, or give up directly and finish the case. 4. The information for copy is invalid. Turn to the "Basic Flow" step 4, or give up directly and finish the case.
Special Requirements	None
Preconditions	Log in THC successfully and go to the tree editor page
Post-conditions	Backup successfully, and the copy is can be use for analysis or modification.
Extension Point	None
Diagram	

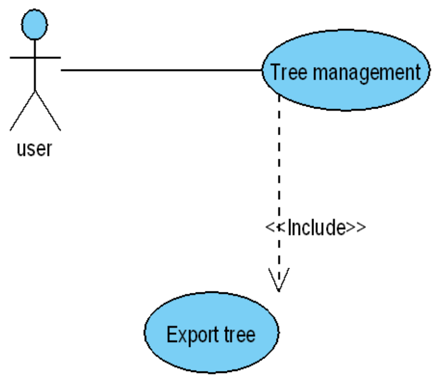
2.2.8 Share Tree

Use Case Name	Share Tree
Use Case ID	UC-THC- ShareTree -12
Brief Description	Users log in the tool and then select the tree to be shared. The trees shared are visible for other users, and they can be used for tree comparison.
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing trees 3. Select the tree to be shared. 4. Publish the tree to share pool and Finish the case ➢ Exception Flow: 1. The tree to be shared is not selected. The tool throws the exception.

	Turn to the "Basic Flow" step 3, or give up directly and finish the case.
Special Requirements	None
Preconditions	Log in THC successfully and go to the tree editor page
Post-conditions	Share tree successfully, and the tree is visible to other users and can be used for analysis.
Extension Point	None
Diagram	

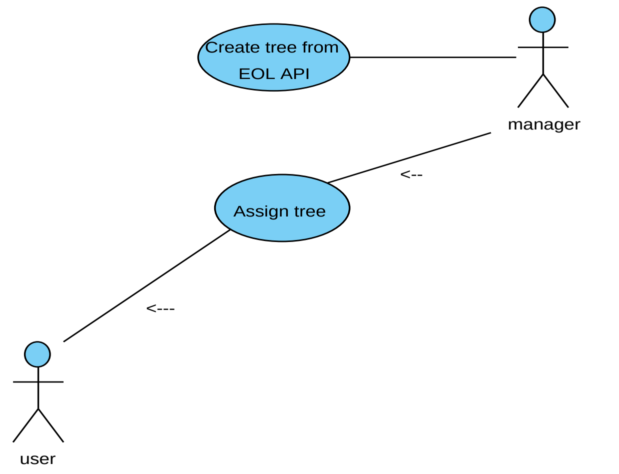
2.2.9 Export Tree

Use Case Name	Export Tree
Use Case ID	UC-THC- ShareTree -13
Brief Description	Users log in the tool and then select the tree to be exported. The trees can be exported as DWCA or BSBC file.
Actors	Users
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing trees 3. Select the tree to be exported. 4. Select the type the tree to be exported as. 5. Export successfully and Finish the case ➢ Exception Flow: 1. The tree to be exported is not selected. The tool throws the exception. Turn to the "Basic Flow" step 3, or give up directly and finish the case.
Special Requirements	None
Preconditions	Log in THC successfully and go to the tree editor page
Post-conditions	Selected tree is save as DWCA or BSBC file.
Extension Point	None

Diagram	

2.2.10 Create Tree from EOL Web API & Tree Assignment

Use Case Name	Create Tree from EOL Web API and Assignment
Use Case ID	UC-THC- EOLWEBAPI -14
Brief Description	Manager log in the tool and go to the tree managing page. This function is only for manager, because retrieve hierarchy is a time-consuming process. The trees from EOL are all shared, so it is not necessary for every user to get hierarchy from EOL. After the tree is retrieved, it will be assigned to a certain user.
Actors	Manager
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing trees 3. Select the tree in EOL to be retrieved. 4. Provide the tree information. 5. Save the tree to THC successfully and assign it to certain user 6. Finish the case ➢ Exception Flow: 1. The tree to be retrieved is not selected. The tool throws the exception. Turn to the "Basic Flow" step 3, or give up directly and finish the case. 2. Information for the tree in invalid. Turn to the "Basic Flow" step 4, or give up directly and finish the case.
Special Requirements	➢ Functional Requirements: Need to provide a list of trees of EOL and detail description. ➢ Nonfunctional Requirements: It is a time-consuming process, need enough time to execute the script. A schedule is needed to update local trees from EOL.
Preconditions	Log in THC successfully and go to the tree editor page
Post-conditions	The selected tree in EOL is saved to THC tool and assigned to certain user. The tree is shared by the user and can be used for analysis.
Extension Point	None

Diagram	

2.3 Use Cases for Experiment

This section is about comparison experiment. The overview of use cases is shown in Fig3.

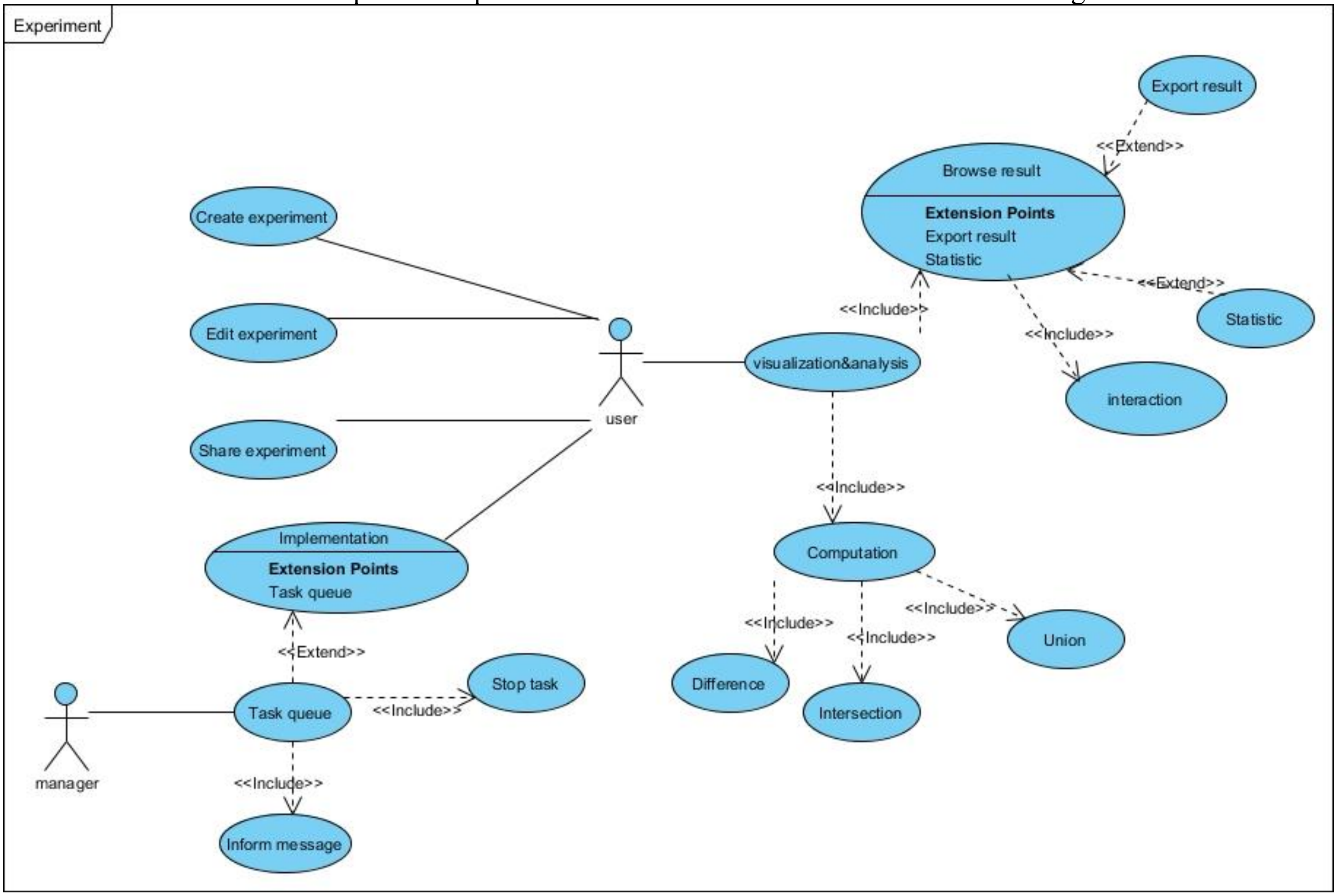
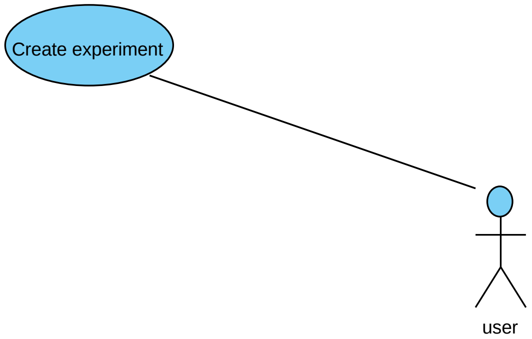


Fig3 Use Cases for Experiment

2.3.1 Create Experiment

Use Case Name	Create Experiment
Use Case ID	UC-THC- CreateExperiment-15
Brief Description	Users log in the tool and go to the experiment managing page. Users provide experiment information and select two trees to be compared.
Actors	User
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing experiment 3. Fill the form of creating experiment; provide name, description for the experiment. 4. Select the trees to be compared. 5. Save the experiment information and Finish the case ➢ Exception Flow: 1. The trees to be compared are not selected. The tool throws the exception. Turn to the "Basic Flow" step 4, or give up directly and finish the case. 2. Information for the experiment in invalid. Turn to the "Basic Flow" step 3, or give up directly and finish the case.
Special Requirements	➢ Functional Requirements: Need to provide a search function to find reference trees from shared pool.
Preconditions	Log in THC successfully and go to the experiment editor page
Post-conditions	An experiment is created but not implemented yet.
Extension Point	None
Diagram	

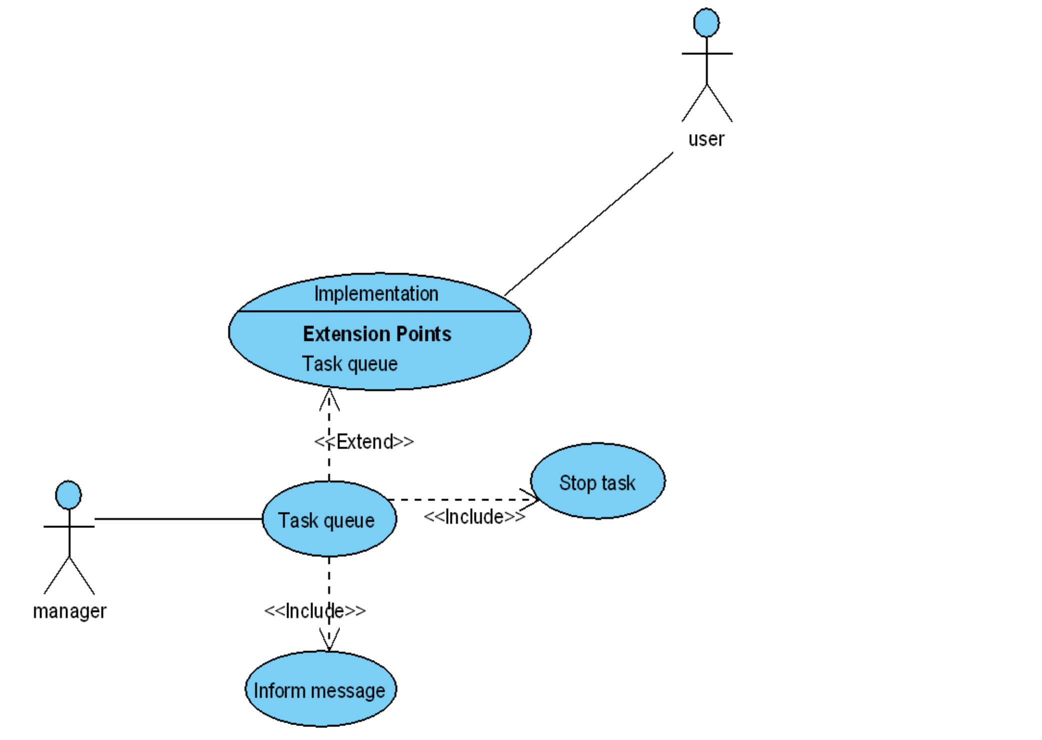
2.3.2 Edit Experiment

Use Case Name	Edit Experiment
Use Case ID	UC-THC- EditExperiment-16
Brief Description	Users log in the tool and go to the experiment managing page. Users select the experiment that has not been implemented for editing.
Actors	User
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing experiment 3. Select the experiment to be edit 4. Provide new information for the experiment 5. Update the experiment and Finish the case

	➢ Exception Flow: 1. The selected experiment has been implemented. Turn to Basic Flow 3 to select other one or give up directly and finish the case. 2. Information for the experiment in invalid. Turn to the "Basic Flow" step 4, or give up directly and finish the case.
Special Requirements	➢ Functional Requirements: Need to provide a search function to find reference trees from shared pool.
Preconditions	Log in THC successfully and go to the experiment editor page. The selected experiment should not be implemented.
Post-conditions	The experiment is updated but not implemented yet.
Extension Point	None
Diagram	Edit experiment user

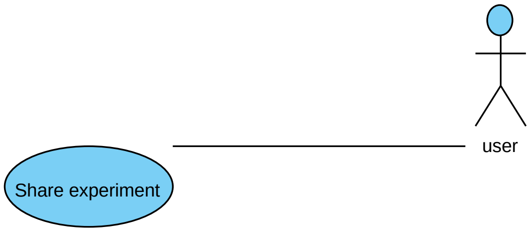
2.3.3 Implementation

Use Case Name	Implement Experiment
Use Case ID	UC-THC- ImplementExperiment -17
Brief Description	Users log in the tool and go to the experiment managing page. Users submit the experiment to be implemented to the task queue, and wait for the response after the experiment is finished. Manager can control the task queue
Actors	User
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing experiment 3. Select the experiment to be implemented 4. Submit the task and wait for the response 5. Implement successfully and Finish the case ➢ Exception Flow: 1. The selected experiment has been implemented. Turn to Basic Flow 3 to select other one or give up directly and finish the case.
Special Requirements	➢ Functional Requirements: Need a message informer to inform user when experiment is finished. It is a time consuming process, task queue should be adopted for implementation.
Preconditions	Log in THC successfully and go to the experiment management page. The selected experiment should not be implemented.
Post-conditions	1. Too many tasks in the queue, and the experiment is put in the queue but will not be implemented immediately. 2. The experiment is implemented and produces result.
Extension Point	Task queue

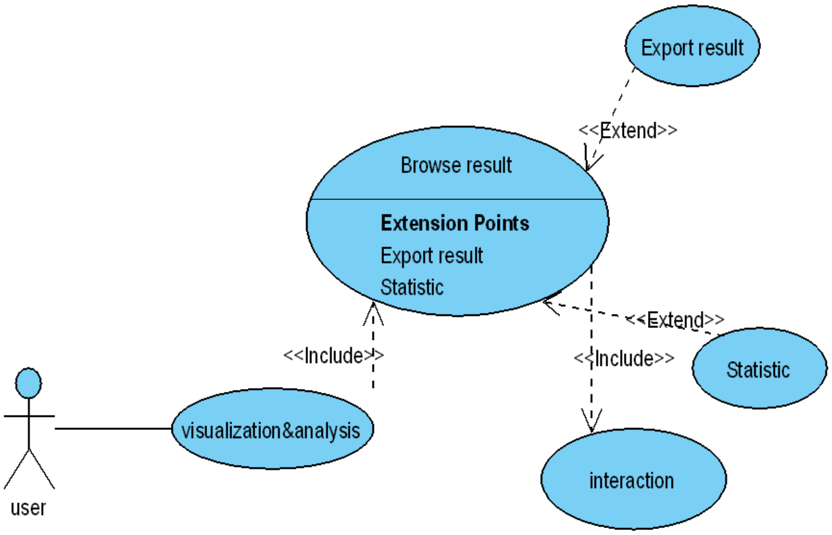
Diagram	 user Implementation Extension Points Task queue <<Extend>> Stop task Task queue <<Include>> manager <<Include>> Inform message

2.3.4 Share Experiment

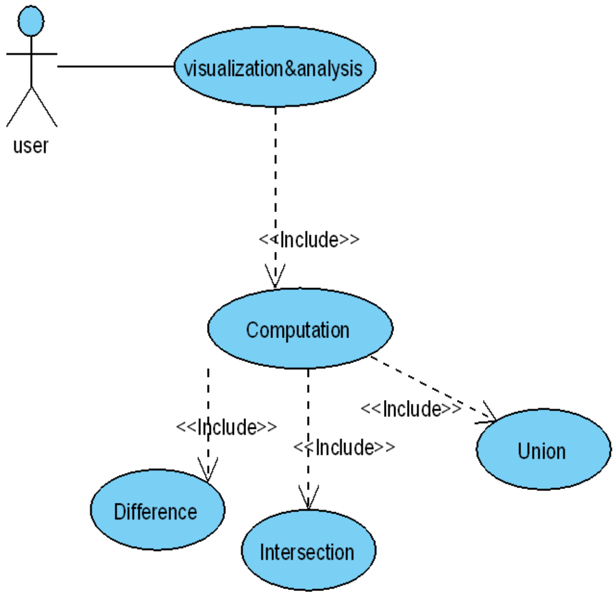
Use Case Name	Share Experiment
Use Case ID	UC-THC-ShareExperiment-18
Brief Description	Users log in the tool and go to the experiment managing page. Users select the experiment to be share. Other users can see the result of the shared experiment.
Actors	User
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing experiment 3. Select the experiment to be shared 4. Publish the experiment and Finish the case ➢ Exception Flow: 1. The selected experiment has not been implemented. Turn to Basic Flow 3 to select other one or give up directly and finish the case.
Special Requirements	None
Preconditions	Log in THC successfully and go to the experiment editor page. The selected experiment should have been implemented.
Post-conditions	The experiment is shared and other users can browse it.
Extension Point	None

Diagram	

2.3.5 Browse Result

Use Case Name	Browse Result
Use Case ID	UC-THC-BrowseResult -19
Brief Description	Users log in the tool and go to the experiment managing page. Select the experiment to browse the result. User can export the result or interactive with the result.
Actors	User
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing experiment 3. Select the experiment to be browsed 4. Browse result in a visualization tool 5. Export the result or get the statistics 6. Interactive with the result trees ➢ Exception Flow: 1. The selected experiment has not been implemented. Turn to Basic Flow 3 to select other one or give up directly and finish the case.
Special Requirements	None
Preconditions	Log in THC successfully and go to the experiment editor page. The selected experiment should have been implemented.
Post-conditions	The result is shown in a visualization tool and user can interactive with the result and export the result.
Extension Point	Export result, Statistic
Diagram	 Export result <<Extend>> Browse result Extension Points Export result Statistic <<Extend>> <<Include>> <<Include>> Statistic user visualization&analysis interaction

2.3.6 Computation

Use Case Name	Computation
Use Case ID	UC-THC-Computation -20
Brief Description	Computation is based on experiment result including “difference”, “union” and “intersection”. The result of computation is a new tree.
Actors	User
Flow of Even	➢ Basic Flow: 1. Log in the tool 2. Go to the page for managing experiment 3. Select the experiment to implement computation 4. Select two trees to compute 5. Select the operator (“difference”, “union” and “intersection”) for computation. 6. Save the computation result 7. Finish the case ➢ Exception Flow: 1. The selected experiment has not been implemented. Turn to Basic Flow 3 to select other one or give up directly and finish the case. 2. The operator is not selected, Turn to Basic Flow 5 to select other one or give up directly and finish the case. 3. Trees are not selected, Turn to Basic Flow 4 to select trees or give up directly and finish the case.
Special Requirements	None
Preconditions	Log in THC successfully and go to the experiment editor page. The selected experiment should have been implemented successfully.
Post-conditions	The result of computation is a tree, and reflects the difference or congruence among the compared trees.
Extension Point	None
Diagram	 user visualization&analysis <<Include>> Computation <<Include>> <<Include>> <<Include>> Union Difference Intersection