Use Cases

The following is a list of the use cases which we have used for planning for our software development.

1. The user wishes to create the simulation and specify general parameters such as the number of devices that will run on the simulation and number of virtual networks.

2. The user wishes to register a device for a particular virtual simulation session. A token based system of registration is used. Upon entering a token, the device is then allowed access to the simulation.
   A fixed number of tokens corresponding to the number of devices in the simulation environment exist. Each device needs to be assigned to at least one virtual network set in the simulation and consumes a token provided by the virtual simulation. Once a token is consumed it cannot be used by other devices.

3. The user wishes to deploy an HTML5 application across all devices in a simulation. Applications may make use of replicated data types which are already available in the simulation, even if this specific user was not the user who deployed the replicated data type.

4. The administrator wishes to specify which virtual networks can communicate with each other and which ones cannot. To do this, the administrator creates a "partition" in the simulation, represented in the Topology View as a connection between networks. This connection is transitive, and all devices within this partition can communicate with each other.

5. The administrator would like the simulation to be replicated consistently across all devices. That is, each device in the simulation views the same state of the simulation, and there is no inconsistency between devices.
   This includes having consistency between replicated data types within a partition. That is, replicated data type should appear the same to each device within a partition. In this case the user should be able to visually see consistency across all devices running the application in our system as data becomes available to all devices on the network. All the applications should have consistent data types and states.

6. The administrator wishes to make an HTML5 application available to all devices within a particular simulation. All devices in this partition should then have access to this HTML5 application.

7. The administrator wishes to move a device from one virtual network to another, or remove it from a network. In the case that the device is removed from a

network and not added to any other network, the device is considered to be in the "free list" of devices which are not contained within any network.

8. The user creates a virtual network from a device and allows other devices to join this new virtual network. Both the mobile device which created the network, and the administrator are able to manage this network. The administrator may as well create their own networks.

9. The virtual device user moves or removes their virtual devices from a network.

10. The user is able to run some test scripts for testing the simulation. These scripts can be used to automatically run the simulation environment without user input. These test scripts include actions such as device movement, RDT interaction, and network interaction.

11. The user checks activity logs for the system. This includes viewing the movements of devices, partitions, and device interactions with RDTs and applications.

12. The administrator displays and manipulates the network topology. This includes joining/connecting networks, separating networks, deleting networks, adding networks. This is all done graphically and can be viewed in real time.

13. The user selects a device to see pertinent device information including, but not limited to the device type and the token used.

14. The user is able to display the network and device topology from a previous state by searching for or selecting a date/time stamp.

15. The user wishes to view the device topology, which is all available networks which that user's device may join and leave.

16. An owner of a virtual device views the event logs of all actions which that device has performed.

17. The admin uploads and runs an automatic test script on the simulation.

Breakdown of Use Cases

Use Case 1: The user wishes to create a simulation

Justification for choosing this use case:
Simulations are the central focus of our project. Therefore, being able to create simulations is crucial, and should be planned for extensively. Thus, this satisfies all three Q's of architecture, and is a necessary use case.

Use Case: Create a Simulation.

Primary Actor: A user of the application.

Scope: The Simulation environment.

Description: The user wishes to create a new simulation. This involves specifying the number of networks, the number of devices, the name of the simulation, and how tokens should be sent out for the simulation.

Preconditions: The server running and able to handle requests. The user is viewing the webpage.

Basic Flow:
1. The user presses the "create simulation" button.
2. The server responds with the page for creating a simulation.
3. The user inputs all parameters to create a simulation, including the number of networks, the number of devices, the token propagation method, and the name of the simulation.
4. The user creates new partitions, networks, and devices to be added to this simulation, including unique names for the partitions and networks, and unique addresses for the devices.
5. The user presses "create simulation".
6. The server checks that all parameters are entered correctly.
7. The server creates the simulation, and propagates it to all users of the webpage.
8. The server propagates the tokens to all who should receive them based on the token propagation method.

Alternate Flows:
1: The user has forgotten to fill in a field
7.2 The server tells the user to correctly fill in the field, and waits to create the simulation until the user has filled in this field.

2: The user has entered a non-unique name for a network or partition, or a non-unique address for a device
7.3 The server tells the user that an inputted name is not unique, and waits to create the simulation until the user has rectified this change

3: The user has not created the number of networks or devices that they input as the number of devices or networks
7.4 The server tells the user that more networks or devices must be created, and waits to create the simulation until the user has ratified this.

Post Condition:
The new simulation has been created. Anyone who accesses the webpage is able to register for this new simulation. The tokens are all propagated to the users who may join the simulation.

Use Case 2: The user wishes to register to a particular simulation

Justification for choosing this use case:
Simulations are the central focus of our project. Being able to access and interact with a simulation is necessary for every part of our project. Therefore this use case is incredibly important to plan for, and we choose to outline this use case in full.

Use Case: Register for a simulation.

Primary Actor: A user accessing the website.

Scope: The Simulation environment.

Description: The user wishes to register for a particular simulation in order to gain access to it, and add their device to the simulation. The user inputs their token into the website in order to enter the simulation

Preconditions: The server running and able to handle requests. The simulation which the user would like to register for exists. The user has a token which has not yet been used.

Basic Flow:
1. The user clicks to register on a particular simulation.
2. The server displays the registration page for that particular simulation page.
3. The user inputs the token which they received into the token field and presses "register"
4. The server checks to ensure that the token is correct and has not yet been used.
5. The simulation adds that user's device to the simulation.
6. The simulation grants the user access to the simulation.

Alternate Flows:
1: The user has forgotten to fill in the token field
3.2   The server tells the user to correctly fill in the field, and does not register them to the simulation.

2: The token is not valid.

4.3   The server tells the user that their token is incorrect and does not register them to the simulation.

3: The token has already been used
7.4 The server informs the user that the token they entered has already been used and does not register them to the simulation.

Post Condition:
The user is registered to the simulation. Their device exists within the simulation, and they are able to view the simulation.

Use Case 12: Display and manipulate the network topology.

Justification for choosing this use case:
This use case is a new feature introduced by the client. It allows the user to see a graphical representation of the networks within a simulation. This is a new, and very extensive feature. As it is nothing which we have dealt with thus far in the project, it satisfies all three Q's of architecture and should be planned for immediately. Thus, we choose to do a use case for this feature.

Use Case: Display and manipulate the network topology.

Primary Actor: The manager of the simulation

Scope: The Simulation environment

Description: The user wishes to display the simulation in a graphical format that is interactive, allowing them to effect network change according to their needs. The user can see how each network is or is not connected and can manipulate these networks to suit their network connectivity needs.

Preconditions: The server running and able to handle requests. While the simulation is running, at least one or more networks and one or more devices must be currently active to effectively display this utility. This simulation must exist, and the user must be the administrator of it.

Basic Flow:
1. The system provided a network and device topology page, displaying all active networks, devices and any relevant connections between them.
2. The user is able to interact with the current objects within the topology. This includes moving devices between networks, removing devices from networks, and creating and deleting partitions between networks.
3. When a user alters the network topology, the topology of all other devices is manipulated.

Alternate Flows:
3: The user does not have the rights to manipulate the topology
3.1 The network topology is available for viewing, though no changes can be made.

Post Condition:
The network topology is displayed correctly across all devices and the topology is manipulated as the user has requested.

Use Case 15: Display and manipulate the device topology.

Justification for choosing this use case:
This use case is a new feature introduced by the client. This is an important use case to do, as it crucial to our project. As well, since this is a new feature, we do not know exactly how to handle it, or what it should do. Therefore, this satisfies the 3 Q's of architecture and should be handled immediately by planning and design. Thus, doing this use case is important.

Use Case: Display and manipulate the device view.

Primary Actor: The user of a particular device.

Scope: The Simulation environment.

Description: This use case details a user viewing a representation of all of the networks within the topology. The user is able to see in what network their device is located in. As well, the user is able to move their device from one network to another, or leave a network.

Preconditions: The server is running and able to handle requests. While the simulation is running, at least one or more networks and one or more devices must be currently active to effectively display this utility. The current user is registered to the simulation with a token, and owns a device in the simulation. This simulation must exist, and the user must have a token for it, connecting it to a device that they own in the simulation.

Basic Flow:
1. The system displays a page to the user detailing all of the networks within the simulation. It displays what network the device is currently contained in.
2. The user is able to move their device between networks and leave the network which they are in.
3. The changes that the user has made updates the current topology of the simulation.

Alternate Flows:
     5: The user does not have the rights to manipulate the topology

5.1 The user is asked to get a token for this simulation in order to view the information in the simulation.

Post Conditions:
The network topology is displayed correctly according to the users needs, with the users device contained within the correct network, and all changes occurring correctly.

Use Case 13: Display device information.

Justification for choosing this use case:
The user must be able to view information about their device. While we do understand this use case, we do not know exactly how it should be dealt with, and even though it only satisfies one of the 3 Q's of architecture, we believe that its importance is enough to warrant planning. Thus, we believe that this use case is important.

Use Case: Display device information.

Primary Actor: The owner of this device.

Scope: The Simulation environment.

Description: The user wishes to display their device's information, up to but not limited to its device type and token information.

Preconditions: The server is running and able to handle requests. This simulation must exist. The current user is registered to the simulation with a token, and owns a device in the simulation.

Basic Flow:
1. The user accesses the page containing the information about their device.
2. The server responds with this page, allowing the user to view it.
3. The user views this page, which contains the up-to-date information about their device. Including, but not limited to, their name, the network which they are in, and their token.

Alternate Flows:
     7: The user does not have the rights to view the details on the device in question
     7.1 The user receives a message asking them to obtain a token in order to view this page.

Post Conditions:

The user has been able to view all the information about their device which they had wanted to see.

Use Case 14: Display network and device topology from a previous state.

Justification for choosing this use case:
This use case is a new feature introduced by the client. It allows the user to recall a previous state of the topology, showing a graphical representation of the network from the past. This is a use case which we have never dealt with thus far, and therefore planning for how the user will interact with this previous state view is crucial. Thus, this use case satisfies the 3 Q's of architecture and we should plan for it. Therefore this use case is necessary.

Use Case: Display network and device topology from a previous state.

Primary Actor: The manager of the simulation.

Scope: The Simulation environment.

Description: The user wishes to recall a previously saved network topology state view it on screen. This will display a graphical representation of what the simulation looked like at that point in time.

Preconditions: The server is running and able to handle requests. This simulation must have been created, and the user must be a manager of it.

Basic Flow:
1. The user requests to see the simulation event logs page.
2. The server displays the simulation event logs page to the user.
3. The user selects a time to view the state of the simulation at.
4. The topology of the simulation at that point in time is displayed for the user on screen.
5. When the user's curiosity is satisfied, the user closes the window.

Alternate Flows:
    8: The user does not have the rights to recall previous network topology states
    8.1 The user cannot access this page.

    9: The user enters the wrong date/time stamp.
    9.1: The system tells the user that no state exists at this time.
    9.2: The user then re-enters the desired date/time stamp and acquires the desired results.

Post Condition:
The device information is displayed correctly, and the user was able to see the topology at that time.

Use Case 9: The owner of a virtual device moves their virtual device to a network

Justification for choosing this use case:
One of the key features of our simulation is the ability for a user to move their device between networks in the simulation. Therefore, it is necessary to plan for how this should happen. Especially, since we do not understand entirely how this should be handled. Therefore, this satisfies the three Q's of architecture, and we must plan for this use case.

Use Case: User moves their virtual device to a network.

Primary Actor: A user of the application.

Scope: The Simulation environment.

Description: The user wishes to move their virtual device into a network in the simulation.

Preconditions: The server running and able to handle requests. The network which the user wishes to move their virtual device into exists. The user is registered to the simulation and owns this virtual device.

Basic Flow:
1. The user views the list of networks
2. The user asks to join the network which they would to put their virtual device into.
3. The server moves the device out of the current network which contains it and into the new network
4. The topology is updated and replicated to all devices in the simulation.

Alternate Flows:
1: The device is already in this network
3.2 The server does not move the device to any network, and leaves it in the correct network.

Post Condition:

The user's virtual device is within the network which they want it to be in. The topology is updated, and all who are viewing the topology can see that the device has been moved to the new network.