Foreword

This document is under revision in response to suggested changes following the initial stakeholder presentation. A number of the changes are significant and impact the overall scope of the project.

The document will be incrementally updated as the planning phase progresses, pending further discussion with the development team.

These changes include, but are not limited to:

- Narrowing the overall scope of the project
    - Reducing or perhaps eliminating the prospective realms with the objective of providing a thorough, more acute focus on a particular subset of algorithms.
    - Carefully considering which algorithms to include in order to create a more cohesive and engaging experience.
    - Updating the Software Requirements Specification to reduce the listed priority level for features deemed non-essential within the new scope.
- Providing a mechanism to enable future development
    - Ensuring the project components are modular, with a focus on future development.
    - Documentation should outline the process of adding components.

Revision History

Version 1.0 Friday April 10th 2015
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Version 1.1 Wednesday April 22nd 2015
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Introduction

Our aim is to develop an interactive learning tool that visually demonstrates the behaviors and uses of key algorithms and data structures, herein referred to as Professor Alberton's Algorithmic Adventures. This document will inform the developers and stakeholders about the applications goals, design and core requirements.

Glossary

Realm – Each of the categories of algorithms and data structures have been assigned to one of the following distinct realms: Sorting, Drawing, Data Structures, Game Theory and Greedy.

GUI (Graphical User Interface) –Application output as represented for the user.

MVC (Model View Controller) – An architectural pattern designed to separate the GUI from the data.

State Driven Design – The data the application software has access to at any given time is represented by a program state.

Notes on terminology - This document contains references to several commonly known algorithms and data structures, and it is expected the reader has a reasonable understanding of what is meant by terms such as binary tree, heap, stack, Conway's Game of Life and so on.

SFML – The Simple Fast Multimedia Library is a high level API for C++ which includes an OpenGL wrapper and provides a robust interface for graphics and audio programming.

Application Overview

Professor Alberton's Algorithmic Adventures is an interactive demonstration and learning tool, targeted at secondary and tertiary students. Its primary objective is to demonstrate the functionality of key algorithms and data structures in a way that is entertaining and engaging.

Professor Alberton's Algorithmic Adventures will have a menu driven interface via which the user will be able to visit a particular realm. A subsequent themed interface will lead them to a selection of several relevant algorithms or data structures, which can then be explored.

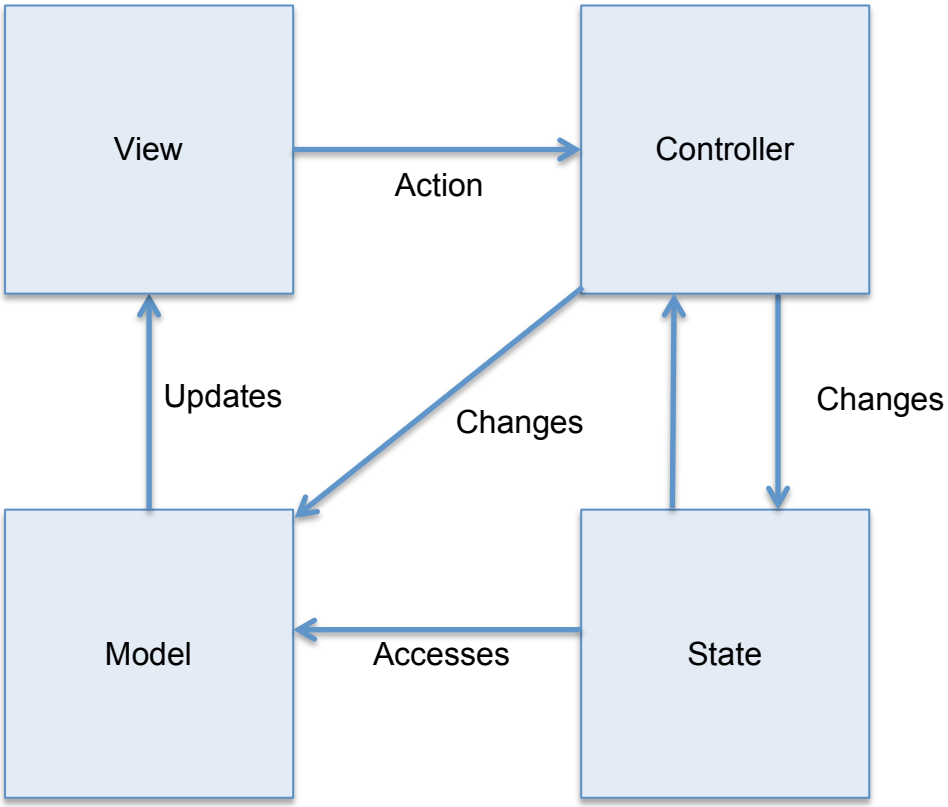
Each algorithm or data structure will have a background or history, followed by a visual demonstration with accompanying pseudo code, and finally a related game or interactive demonstration.

Games and interaction will make up the core focus of the application and will be aimed at developing some fundamentals skills required to fully understand the practical use of algorithms and data structures.

Application Structure

The internal structure of the application will combine elements of MVC and state driven design. This will allow for prototyping design methodology, due in part to the separation of interface and data that MVC informs, and inherently modular nature of state driven architecture.

- The GUI will listen for actions, which are subsequently passed to and handled by the controller.
- The controller then changes the program state (for example from displaying menu to demonstrating Quick Sort), which then has exclusive access to the relevant data, which in turn updates the view and displays the output/listens for the next action.
- Actions don't always lead to a change in program state. Inserting data into a binary tree for example, will update the model directly, rather than altering the program state.



State:

```
enum ProgramState { Uninitialized,
                    ShowingSplash,
                    Paused,
                    ShowingMenu,
                    ShowingSubMenu,
                    Running,
                    Exiting };

static ProgramState programState;
```

View:

```
static sf::RenderWindow mainWindow;
```

Controller:

```
if(currentEvent.type == sf::Event::Closed){
    programState = MainLoop::Exiting;
}
```

Model:

```
MainMenu::MenuResult MainMenu::Show(sf::RenderWindow& renderWindow)

    renderWindow.clear(sf::Color(63,63,63));

    //Begin menu item coordinates
    MenuItem beginButton;
    beginButton.rect.top= 200;
    beginButton.rect.height = 80;
    beginButton.rect.left = 312;
    beginButton.rect.width = 400;
    beginButton.action = SubMenu;
```

Additional Dependencies

Though the application will be stand-alone and programmed in C++/SFML/OpenGL, it will have dependencies within its own structure.

Professor Alberton will explain the history and context with the help of an animated chalk-board. Such draw-able objects will be shared by the different realms.

The same can be said for the animations of Professor Alberton himself, as the base animations will be the same across the application.

Such dependencies not only reduce the amount of duplicated code, but increase the modularity of the project, allowing changes to be made to shared assets quickly and without breaking existing code.

Requirement Specifications

Priorities

Critical: Requirements that offer core functionality

Essential: Requirements that are integral to meet the overall project objectives.

Desirable: Requirements that provide non-essential functionality, but would enhance the experience.

Stretch: Requirements that provide non-essential functionality, but will only be considered should all other requirements be met.

Key

The following key codes the requirements.

General Requirements	GA1-G
Sorting	GA1-S
Sorting Stretch Goals	GA1-STS
Drawing	GA1-DR
Data Structures	GA1-DS
Data Structures Stretch Goals	GA1-STDA
Game Theory	GA1-GA
Greedy	GA1-STGR
Non-functional Requirements	GA1-NF

CSCI321 PROJECT REQUIREMENTS SPECIFICATIONS GA1

Requirement #: GA1-G1	Requirement Type: Functional	Use Case #:
Description: Menu driven GUI		
Rationale: The application should be navigable via a menu driven GUI		
Fit Criterion: All program features and accessories should be easily identifiable and accessible via a GUI		
Dependencies: N/A	**Rank of Importance:** Critical	

Requirement #: GA1-G2	Requirement Type: Functional	Use Case #:
Description: Language agnostic demonstrations		
Rationale: Integral to the overall project objective		
Fit Criterion: The algorithms are explained and demonstrated with language agnostic pseudo code		
Dependencies: N/A	**Rank of Importance:** Critical	

Requirement #: GA1-G3	Requirement Type: Functional	Use Case #:
Description: That each demonstration has graphics and animations that are relevant and engaging		
Rationale: Essential to fulfil the overall project objective		
Fit Criterion: Graphics and animations present		
Dependencies: N/A	**Rank of Importance:** Essential	

Requirement #: GA1-G4	Requirement Type: Functional	Use Case #:
Description: Interactivity		
Rationale: An interactive approach to the learning process is integral to the overall project objective		
Fit Criterion: That a game, or interactive demonstration is present for each of the algorithms or data structures present in the application.		
Dependencies: N/A	**Rank of Importance:** Desirable	

CSCI321 PROJECT REQUIREMENTS SPECIFICATIONS GA1

Requirement #: GA1-S1	Requirement Type: Functional	Use Case #:
Description: Educate user on the history/development of the quick sort algorithm		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history/development of the quick sort algorithm into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S2	Requirement Type: Functional	Use Case #:
Description: Demonstrate the quick sort algorithm in context		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the quick sort algorithm in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S3	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the quick sort algorithm		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show pseudo code for the quick sort algorithm alongside a an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S4	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate quick sort		
Rationale: Integral to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate the quick sort algorithm in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

CSCI321 PROJECT REQUIREMENTS SPECIFICATIONS GA1

Requirement #: GA1-S5	Requirement Type: Functional	Use Case #:
Description: Educate user on the history/development of the bubble sort algorithm		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history/development of the bubble sort algorithm into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S6	Requirement Type: Functional	Use Case #:
Description: Demonstrate the bubble sort algorithm in context		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the bubble sort algorithm in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S7	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the bubble sort algorithm		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show pseudo code for the bubble sort algorithm alongside a an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S8	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate bubble sort		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate the bubble sort algorithm in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

Requirement #: GA1-S9	Requirement Type: Functional	Use Case #:
Description: Educate user on the history/development of the selection sort algorithm		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history/development of the selection sort algorithm into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S10	Requirement Type: Functional	Use Case #:
Description: Demonstrate the selection sort algorithm in context		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the selection sort algorithm in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S11	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the selection sort algorithm		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show pseudo code for the selection sort algorithm alongside a an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S12	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate selection sort		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate the selection sort algorithm in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

Requirement #: GA1-S13	Requirement Type: Functional	Use Case #:
Description: Educate user on the history/development of the insertion sort algorithm		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history/development of the insertion sort algorithm into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S14	Requirement Type: Functional	Use Case #:
Description: Demonstrate the insertion sort algorithm in context		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the insertion sort algorithm in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S15	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the insertion sort algorithm		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show pseudo code for the insertion sort algorithm alongside a an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-S16	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate insertion sort		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate the insertion sort algorithm in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

CSCI321 PROJECT REQUIREMENTS SPECIFICATIONS GA1

Requirement #: GA1GA1	Requirement Type: Functional	Use Case #:
Description: Educate user on game states via the farmer and the goat game		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history/development of the farmer and the goat problem into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA2	Requirement Type: Functional	Use Case #:
Description: Demonstrate the farmer and the goat problem		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the farmer and the goat problem in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA3	Requirement Type: Functional	Use Case #:
Description: Represent the farmer and the goat problem in terms of states		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show the winning and losing states alongside a demonstration of the farmer and the goat problem		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA4	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate the farmer and the goat		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate the farmer and the goat problem		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

CSCI321 PROJECT REQUIREMENTS SPECIFICATIONS GA1

Requirement #: GA1GA5	Requirement Type: Functional	Use Case #:
Description: Educate user on game states via the water buckets game		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history/development of the water bucket game		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA6	Requirement Type: Functional	Use Case #:
Description: Demonstrate the water bucket game		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the water bucket problem in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA7	Requirement Type: Functional	Use Case #:
Description: Represent the water bucket problem in terms of states		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show the winning and losing states alongside a demonstration of the water bucket problem		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA8	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate the farmer and the goat		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate the water bucket		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

CSCI321 PROJECT REQUIREMENTS SPECIFICATIONS GA1

Requirement #: GA1GA9	Requirement Type: Functional	Use Case #:
Description: Educate user on game states via the tower of Hanoi game		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history/development of the tower of Hanoi		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA10	Requirement Type: Functional	Use Case #:
Description: Demonstrate the tower of Hanoi game		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the tower of Hanoi problem in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA11	Requirement Type: Functional	Use Case #:
Description: Represent the water bucket problem in terms of states		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show the winning and losing states alongside a demonstration of the tower of Hanoi problem		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-GA12	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate the tower of Hanoi		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate the tower of Hanoi		
Dependencies: GA1-G1 to GA1-Gn	**Rank of Importance:** Desirable	

CSCI321 PROJECT REQUIREMENTS SPECIFICATIONS GA1

Requirement #: GA1GA13	Requirement Type: Functional	Use Case #:
Description: Demonstrate the rules of Conway's game of life		
Rationale: A good way demonstrate states and rules		
Fit Criterion: Successfully show how game of life works		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

Requirement #: GA1-GA14	Requirement Type: Functional	Use Case #:
Description: Demonstrate Conway's game of life in action		
Rationale: Desirable to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows Conway's game of life in action		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

Requirement #: GA1-DA1	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of the heap structure		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history of Heap structure's into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA2	Requirement Type: Functional	Use Case #:
Description: Demonstrate the Heap structure in context		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the heap structure in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA3	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the heap structure		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show pseudo code for heap structure's alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA4	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate heap structure's		
Rationale: Integral to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate Heap structure's in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

Requirement #: GA1-DA5	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of the stack structure		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history of stack structure's into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA6	Requirement Type: Functional	Use Case #:
Description: Demonstrate the Stack structure in context		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the stack structure in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA7	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the stack structure		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show pseudo code for stack structure's alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA8	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate stack structure's		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate stack structure's in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

Requirement #: GA1-DA9	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of the queue structure		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history of queue structure's into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA10	Requirement Type: Functional	Use Case #:
Description: Demonstrate the queue structure in context		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the queue structure in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA11	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the queue structure		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show pseudo code for queue structure's alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA12	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate queue structure's		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate queue structure's in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

Requirement #: GA1-DA13	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of the tree structure		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate the history of tree structure's into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA14	Requirement Type: Functional	Use Case #:
Description: Demonstrate the tree structure in context		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the tree structure in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA15	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the tree structure		
Rationale: Integral to the overall project objective		
Fit Criterion: Successfully show pseudo code for tree structure's alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-DA16	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate tree structure's		
Rationale: Desirable to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate tree structure's in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Desirable	

Requirement #: GA1-STS1	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of bogo sort		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of bogo sort into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STS2	Requirement Type: Functional	Use Case #:
Description: Demonstrate bogo sort in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows Bogo sort in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STS3	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for bogo sort		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully show pseudo code for bogo sort alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STS4	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate bogo sort		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate bogo sort in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STS5	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of radix sort		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of Radix sort into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STS6	Requirement Type: Functional	Use Case #:
Description: Demonstrate radix sort in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows radix sort in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STS7	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for radix sort		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully show pseudo code for radix sort alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STS8	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate radix sort		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate radix sort in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STDA1	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of arrays		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of Arrays into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STDA2	Requirement Type: Functional	Use Case #:
Description: Demonstrate arrays in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the arrays structure in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STDA3	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate arrays		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate arrays in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STDA5	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of the lists structure		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of Lists structure's into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STDA6	Requirement Type: Functional	Use Case #:
Description: Demonstrate the lists structure in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows the lists structure in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STDA7	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for the lists structure		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully show pseudo code for lists structure's alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STDA8	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate lists structure's		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate lists structure's in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR1	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of branch & bound		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of branch & bound into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR2	Requirement Type: Functional	Use Case #:
Description: Demonstrate branch & bound in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows branch & bound in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR3	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for branch & bound		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully show pseudo code for branch & bound alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR4	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate branch & bound		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate branch & bound in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR5	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of divide & conquer		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of divide & conquer into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR6	Requirement Type: Functional	Use Case #:
Description: Demonstrate divide & conquer in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows divide & conquer in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR7	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for divide & conquer		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully show pseudo code for divide & conquer alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR8	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate divide & conquer		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate divide & Conquer in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR9	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of merging		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of Merging into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR10	Requirement Type: Functional	Use Case #:
Description: Demonstrate merging in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows merging in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR11	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for merging		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully show pseudo code for Merging alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR12	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate merging		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate merging in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR13	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of shortest job first		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of Shortest Job First into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR14	Requirement Type: Functional	Use Case #:
Description: Demonstrate shortest job first in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows shortest job first in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR15	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for shortest job first		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully show pseudo code for shortest job first alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR16	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate shortest job first		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate Shortest Job First in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR17	Requirement Type: Functional	Use Case #:
Description: Educate user on the history of a-star		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate the history of a-star into the application		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR18	Requirement Type: Functional	Use Case #:
Description: Demonstrate A Star in context		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully integrate a demonstration that shows a-star in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR19	Requirement Type: Functional	Use Case #:
Description: Show pseudo code for a-star		
Rationale: Suited to the overall project objective		
Fit Criterion: Successfully show pseudo code for a-star alongside an algorithm demonstration		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

Requirement #: GA1-STGR20	Requirement Type: Functional	Use Case #:
Description: Interactive game or activity to demonstrate a-star		
Rationale: Suited to the overall project objective		
Fit Criterion: The application will integrate an activity or game to demonstrate a-star in context		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Stretch	

CSCI321 PROJECT REQUIREMENTS SPECIFICATIONS GA1

Requirement #: GA1-NF1	Requirement Type: Look and Feel	Use Case #:
Description: Distinct and varied visual design for each realm		
Rationale: Provide interest and clarity to the application structure for users		
Fit Criterion: Design different visual elements for each realm		
Dependencies: GA1-G3	**Rank of Importance:** Desirable	

Requirement #: GA1-NF2	Requirement Type: Look and Feel	Use Case #:
Description: Sound effects for menu navigation		
Rationale: Assists in useability and users perception of responsiveness		
Fit Criterion: The application will play appropriate and consistent sounds during menu navigation that reinforce the functionality		
Dependencies: GA1-G1	**Rank of Importance:** Essential	

Requirement #: GA1-NF3	Requirement Type: Look and Feel	Use Case #:
Description: Music / ambient audio		
Rationale: Adds to the feel of the user experience		
Fit Criterion: The application will play realm-specific background music/sounds that complement the visual design		
Dependencies: GA1-G3	**Rank of Importance:** Desirable	

Requirement #: GA1-NF4	Requirement Type: Useability	Use Case #:
Description: The application must be accessible		
Rationale: We must provide a level of accessibility appropriate to our intended users		
Fit Criterion: The product shall be easy for secondary/tertiary students to use with no assumed prior knowledge		
Dependencies: GA1-G1 to GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-NF5	Requirement Type: Useability	Use Case #:
Description: Ensure GUI is intuitive and easy to navigate		
Rationale: Ready access to the content will make the application more engaging		
Fit Criterion: The product shall be easy for secondary/tertiary students to use with no assumed prior knowledge		
Dependencies: GA1-G1	**Rank of Importance:** Essential	

Requirement #: GA1-NF6	Requirement Type: Useability	Use Case #:
Description: The application is fun and engaging		
Rationale: A game-like approach to learning makes the process more entertaining		
Fit Criterion: The application will be interactive and feature colourful imagery and sounds		
Dependencies: GA1-G3 & GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-NF7	Requirement Type: General	Use Case #:
Description: The application will be educational		
Rationale: Integral to the overall project objective		
Fit Criterion: The application will impart knowledge through a combination of text, diagrams and interactive features		
Dependencies: GA1-G2 & GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-NF8	Requirement Type: Performance	Use Case #:
Description: Responsive interface		
Rationale: Unresponsive interfaces detract from the user experience and should be avoided		
Fit Criterion: User interactions will result in immediate visual and/or aural feedback		
Dependencies: GA1-G1 & GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-NF9	Requirement Type: Performance	Use Case #:
Description: Scale content appropriately for different resolutions		
Rationale: Scalability ensures a high quality image for a wide range of users		
Fit Criterion: The imagery and typefaces used in the product must be scalable to accommodate a range of screen resolutions		
Dependencies: GA1-G3	**Rank of Importance:** Desirable	

Requirement #: GA1-NF10	Requirement Type: Performance	Use Case #:
Description: Algorithm performance		
Rationale: Visual elements will add computational overheads so algorithms need to be efficient		
Fit Criterion: Ensure all algorithms execute efficiently in terms of number of operations		
Dependencies: N/A	**Rank of Importance:** Essential	

Requirement #: GA1-NF11	Requirement Type: Operational	Use Case #:
Description: Provide support for popular desktop operating systems		
Rationale: Important to ensure the environment required to use our product is available		
Fit Criterion: Create binaries for Windows and OSX		
Dependencies: N/A	**Rank of Importance:** Critical	

Requirement #: GA1-NF12	Requirement Type: Operational	Use Case #:
Description: Support suitable input devices for the user		
Rationale: Commonly available hardware allows for a wider userbase		
Fit Criterion: Design the application to use keyboard and mouse		
Dependencies: GA1-G1 & GA1-G4	**Rank of Importance:** Essential	

Requirement #: GA1-NF13	Requirement Type: Legal	Use Case #:
Description: Product should be G rated		
Rationale: Application is to be used by secondary students		
Fit Criterion: Keep all content within the bounds of the G classification as set out by the Australian Classification Board		
Dependencies: GA1-G2 to GA1-G4	**Rank of Importance:** Essential	