



1 Introduction

In this assignment, you will have three Operating Systems (OS) options to choose from.

1. You can take the *mission control* path, in which you research, design and implement operating systems that could best be specialized for the management of individual, highly specialized projects.
2. You can take the *cyber defense* path, in which you research, design and implement operating systems that could best be used in the protection of sensitive data.
3. You can take the *project management* path, in which you research, design and implement operating systems that could best be used to manage operations over large, distributed ventures.

This is a group assignment. Turn in your work on or before the deadline on Blackboard to receive credit.

2 Approved Example Contexts

1. If you choose option *mission control*, you are interested in:
 - (a) an operating system that exists at the core of a Mars Rover
 - (b) an operating system on the spacecraft flown during an Apollo mission
 - (c) an operating system that runs on a Phantom v2512 camera
 - (d) an operating system that runs on the Artec Space Spider
 - (e) an operating system that runs on a Leica Microsystem microscope
2. If you choose option *cyber defense*, you are interested in:
 - (a) an operating system that is used by the UBS Swiss Bank vault
 - (b) an operating system that is used for making secure phone calls via voice scrambler / descrambler
 - (c) an operating system that is used for hosting secure servers: designated by https
 - (d) an operating system used in servers that exhibit onion routing
3. If you choose option *project management*, you are interested in:
 - (a) an operating system that is used to manage warehouse inventory
 - (b) an operating system that is used for stock market trades
 - (c) an operating system that is used to manage large quantities of servers, such as those owned by Google
 - (d) an operating system that is used to manage a University scheduling system of classes
 - (e) an operating system that is used to manage train schedules for a given station

3 Research Component

1. Indicate your choice here: *mission control*, *cyber defense*, or *project management*.
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2. Identify and name a real example context from the list above that demonstrates your choice. Note: if you would like to find your own example that is not on the above list, you must get this example approved by the instructor, in writing over email, prior to proceeding with the rest of this project. Once approved in writing, or chosen from the above list, write that example here.
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3. Next, you are to research, and provide credible online sources for, the real operating system that is used for this specific purpose. In other words, you may use Wikipedia as a starting point, but then you will need to verify the sources you actually report here as being credible. Upon finding this answer, write that operating system here, along with the links for at least two credible online sources that confirm its use in this purpose.
 - Operating System:
 - Source 1 Link:
 - Source 2 Link:
4. Explain why this operating system is used for this specific purpose. Give one historical reason, one financial reason, one hardware reason, and one purposeful reason, and provide one or more credible online source links that confirm these reasons.
 - Historical Reason:
 - Financial Reason:
 - Hardware Reason:
 - Purposeful Reason:
 - Source Link:
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5. Now that you understand why this operating system was chosen for this specific purpose, you must identify the name and version number of operating systems that exist in four categories, that have the potential to be related to the specific purpose you have chosen.
 - (a) Windows, Name / Version Number:
 - (b) Macintosh, Name / Version Number:
 - (c) Linux, Name / Version Number:
 - (d) Other, Name / Version Number:
6. For each of the above operating systems, provide one reason why it is related to the purpose. Indicate whether this is a historical, financial, hardware or purposeful reason, along with a new, credible online source link for each. For each source, this must be a new link, not being the same base website or quoted material as any previous link.
 - (a) Windows Reason:
Source Link:
 - (b) Macintosh Reason:
Source Link:
 - (c) Linux Reason:
Source Link:
 - (d) Other Reason:
Source Link:
7. Now that you have an understanding of what reasons would be used to choose an operating system for a specific purpose, you are to design a new, very small, operating system as detailed below, for the same specific purpose.

4 Design Component

This design will exist in two phases: planning, and execution.

4.1 Planning Phase

Create an informal 'box and arrows' diagram, in which you plan out the features of your new operating system. See the Windows, Unix, Linux, etc. operating systems 'box and arrows' diagrams at the end of Lecture 2 slides (posted on course website) to get an idea for the diagram you want to create. Remember to keep the specific purpose you have chosen in mind. You need to include the below four features from **4.2 Execution Phase** in your diagram, in addition to three custom features of your own choosing. You must include three features that are custom for the specific purpose you have been researching thus far. Write those three features here.

- Feature 1
- Feature 2
- Feature 3

4.2 Execution Phase

Implement this plan in Java, C++, Python, or C, to be run by a user in an IDE context (IntelliJ, Visual Studio, etc). This implementation needs to include the following features:

1. User Input (keyboard, mouse, or other)
 2. Load Program (transfer files from RAM to CPU)
 3. Refresh RAM (transfer data from CPU to RAM)
 4. User Output (text-based, visual, or audio)
- The three custom features as detailed in the **4.1 Planning Phase**.

Caveat: I do not expect you to write code that truly interfaces with the drivers you would actually find in a keyboard, CPU, RAM, or monitor. You are welcome to simulate these components using hardcoded data as much as you would like. Consider the following suggestions:

- You may create a data structure called RAM (possibly composed of an ArrayList in Java) that your program can write to and read from as necessary. Perhaps this data structure stores file names of local *.txt files that contain code that should be executed by the CPU.
- You may use `System.out.println()` in Java if you want to provide user output.
- You may use any number of math functions to execute CPU functions.

5 What to Turn In

Turn in one PDF or Word document on Blackboard, containing the following items.

1. All pages scanned or photographed of the Midterm completed document.
2. Any additional pages you used to complete the assignment.
3. All code created for the assignment, along with test cases.
4. One statement indicating which parts of your implementation(s) are working, and which parts are not.
5. Screenshots demonstrating the output of the code, whether working or not.