

Thinking like a computer to understand how it works

Unit 2: Introduction to operating systems

Information systems

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A NEED TO KNOW

1. Definition and evolution
2. Fundamentals, structure and components
3. Resources management
4. Licenses

CALP. 15-20 KEYWORDS

1. PRIOR

Computer	Hardware	Software	Program
Memory	Operating system	I/O (Input/output)	

2. NEW

Algorithm	File system	Kernel	Fragmentation
Partition	System call	Multitasking	Multi-user
Batch	Multiprogramming	Shared time	Virtual memory
Shell	Real-time system	Distributed system	

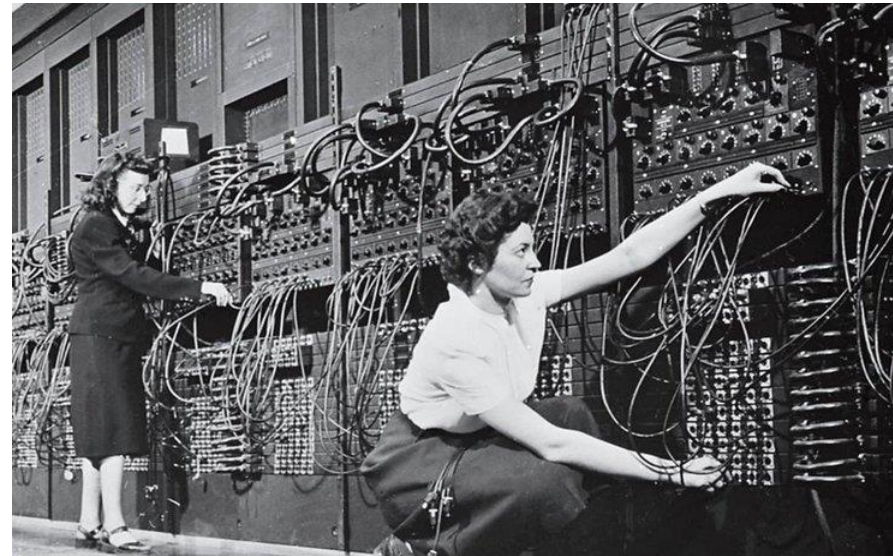
ADVANCE ORGANIZER



<http://cs.nyu.edu/~gottlieb/courses/os/diagrams/gridlock-crop-shrink.png>

1. Imagine these cars are computer processes, what do we need to control them efficiently?

2. What if this computer should run thousand of tasks simultaneously?



<http://www.phillyvoice.com/70-years-ago-six-philly-women-eniac-digital-computer-programmers/>

DRIVING QUESTION

- How can a computer simultaneously run several tasks in the most efficient way?

INTRODUCTION TO THE PROJECT: EXEMPLARS



<https://www.youtube.com/watch?v=YPY9Y7KeSOE>



<https://www.youtube.com/watch?v=wTmVnglSGQ4>

INTRODUCTION TO THE PROJECT: HOTS

1. Analyze: What do these videos have in common? What is the relationship between these videos and operating systems?
2. Evaluate: Let's split up the class into groups of 3-4 people. Each group should **choose something different related to the running of operating systems you have learned or researched** (scheduling algorithms, multiprogramming, time-sharing, memory management, etc). Now, think about a **real life scenario** which you can associate with your decision.
3. Create: In the same groups, create a **storyboard** in which you plan a video about how to perform a daily task like an operating system should do.

TRACKING THE PROJECT

- Create a portfolio in which students will upload their progress.
- The platform used might be Eduportfolio or something similar.



http://formacion.educalab.es/pluginfile.php/46361/mod_imsdp/content/1/eduportfolio.PNG

- The students will progressively add new versions and comments about the video, so that the teacher can make a comparison with the initial storyboard and track the progress.

TASK-BASED LEARNING

1. Presentation: Compare performance of each disk scheduling algorithm, using diagrams like on this website: <http://www2.cs.uregina.ca/~hamilton/courses/330/notes/io/node8.html>
2. Practice: Given a queue of disk read requests, work in the same 3-4 people groups as in the projects and assign an algorithm for each one.
3. Production: Share your diagram and results and compare with your classmates.

PROBLEM-BASED LEARNING

1. Present content: Virtual memory allows a computer to compensate for physical memory shortages by temporarily transferring data from random access memory (RAM) to disk storage to extend RAM memory.
2. Pose problem: There are different methods to manage virtual memory: fragmentation, segmentation or segmented paging.
3. Solutions: You should research the advantages and disadvantages of each one in the same groups. Finally, all the class will debate to decide which is the best method.

SESSIONS

- Session 1
 1. Advance organizer.
 2. Content: Definition and goals of operating systems. Choose a current operating system. Why do we need a software layer to manage resources and schedule tasks?
 3. Content: Evolution of operating systems. Create a timeline in which you include those you consider the most 10 important operating systems throughout the history. PEER FEEDBACK. Students will offer each other feedback on checking if there is other operating systems more important than those chosen. Why have computers been able to run more and more tasks throughout the history?
- Session 2
 1. Content: Types of operating systems. How do you classify the operating systems used in the classroom?
 2. Content: Functions of operating systems. Choose the function of operating systems you consider more useful. Why do computers need this function to “think”?
 3. Content: Structure and components of operating systems. What do operating systems need to work? Which is the most important component?

SESSIONS

- Session 3
 - Content: Scheduling algorithms. Simulate a computer process using the algorithms you have studied. PEER FEEDBACK. Students will offer each other feedback on how they have applied the algorithms. Which strategy do you consider more efficient?
- Session 4: Introduction to the project and exemplars. Create a video to study the running of operating system through daily tasks. HOTS: Analyze, Evaluate and Create.
- Session 5
 - Content: Disk scheduling algorithms. TASK-BASED LEARNING. Simulate requests to the hard disk using the algorithms you have studied. Which one do you consider to have the least seek time?
- Session 6
 1. Content: Memory management. PROBLEM-BASED LEARNING. Which is the best method to manage virtual memory?
 2. Content: Licenses. Classify Windows, Linux and Mac, according to their license. What does Android license allow us?
- Session 7: Feedback Session.
- Session 8: Final Details of projects.
- Session 9: Present videos.

CHECKLIST

1. Presentation:

- Before playing the video, they introduce self and topic
- Contents are not offensive
- Engage listener
- Appropriate attitude
- Each person speaks, when necessary

2. Project video:

- Play the video (between 5 and 10 minutes)
- Explanation in the video is clear and makes sense.
- Results are right and logical.
- Originality of the idea.
- Portfolio contents demonstrates teamwork and tracking the project.

3. Content:

- Operating system function (defend choice).
- A short theoretical explanation.
- Real-life task you use to explain the function (defend choice).
- Implementing the real-life task like a computer would do.
- Show results and how efficient the task has been performed.

ASSESSMENT (First part)

ACTIVITY	Exemplary	Proficient	Partially Proficient	Incomplete	POINTS
Concept	<p><u>15-20 points</u> Adequate description of what they are trying to do and generally how his/her work will contribute to the final project.</p>	<p><u>10-14 points</u> Can describe what they are trying to do overall but has trouble describing how his/her work will contribute to the final project.</p>	<p><u>5-9 points</u> Has brainstormed their concept, but no clear focus has emerged. Goals/final product not clearly defined.</p>	<p><u>0-4 points</u> Little effort has been spent on brainstorming and refining a concept. Unclear on the goals and how the project objectives will be met.</p>	
Script/ Storyboard	<p><u>12-15 points</u> The storyboard includes notes of proposed transition, special effects, sound and title tracks includes text, color, placement, graphics, etc. Notes about proposed dialogue/narration text are included.</p>	<p><u>8-11 points</u> The storyboard includes descriptions of background audio for each scene, and notes about proposed shots and dialogue.</p>	<p><u>4-7 points</u> The thumbnail sketches on the storyboard are not in logical sequence and do not provide complete descriptions of the video</p>	<p><u>0-3 points</u> There is no evidence of a storyboard or script.</p>	
Content	<p><u>15-20 points</u> The content includes a clear statement of purpose or theme and is creative, compelling and clearly written. A rich variety of supporting information in the video contributes to the understanding of the project's main idea. Events and messages are presented in a logical order.</p>	<p><u>10-14 points</u> Information is presented as a connected theme with accurate, current supporting information that contributes to understanding the project's main idea. Details are logical and persuasive information is effectively used. The content includes a clear point of view with a progression of ideas and supporting information. Includes properly cited sources.</p>	<p><u>5-9 points</u> The content does not present a clearly stated theme, is vague, and some of the supporting information does not seem to fit the main idea or appears as a disconnected series of scenes with no unifying main idea. Includes few citations and few facts.</p>	<p><u>0-4 points</u> Content lacks a central theme, clear point of view and logical sequence of information. Much of the supporting information is irrelevant to the overall message.</p>	

ASSESSMENT (Second part)

ACTIVITY	Exemplary	Proficient	Partially Proficient	Incomplete	POINTS
Quality	<p><u>12-15 points</u> Movie was completed and had all required elements. The video was well edited and moves smoothly from scene to scene with proper use of transitions. Audio and other enhancements were well used.</p>	<p><u>8-11 points</u> Movie was completed and contained all required items. Editing was not done as well as it should have been. Some poor shots remain. Movie is still somewhat choppy. Audio and other enhancements were utilized, but not for maximum effect.</p>	<p><u>4-7 points</u> Movie was made, but had very little if any editing. Many poor shots remain. Video was very fragmented and choppy with little to no audio reinforcement.</p>	<p><u>0-3 points</u> There was no movie, or tape was totally unedited with no transitions or audio support of any kind.</p>	
Teamwork (through the Portfolio)	<p><u>12-15 points</u> Student met and had discussions regularly. All students on the team contributed to the discussion and were part of the final project. Team members showed respect with each other.</p>	<p><u>8-11 points</u> Students met and had discussions regularly. Most of the students on the team contributed to the discussion and were part of the final project. Team members mostly showed respect with each other.</p>	<p><u>4-7 points</u> Only a couple of team meetings were held. Most of the students on the team contributed at some level, but a majority of the work was done by one or two.</p>	<p><u>0-3 points</u> Meetings were not held and/or some of the team members did not contribute at all to the project. Low levels of respect were evident within the team.</p>	
Timeliness	<p><u>12-15 points</u> All project deadlines were met.</p>	<p><u>8-11 points</u> Most project deadlines were met. Those that were late did not have significant impact on the finished project.</p>	<p><u>4-7 points</u> Many project deadlines were not met, resulting in some impact on the finished project.</p>	<p><u>0-3 points</u> Deadlines were regularly missed, having a significant impact on the final project.</p>	
Final Score					