EECS3221 Section Z
Operating System Fundamentals
Winter 2024
Assignment 1
A Comparison of Real-Time Operating Systems / Kernels and the Linux Operating System / Kernel
Due Date: Wednesday February 14, 2024, 23:59.

A. Description of the Assignment

Imagine that a company has been using the Linux operating system / kernel for all of its products that are used in a broad range of industrial / commercial applications in the past, but the company has heard that it could be advantageous to use a real-time operating system/ kernel instead of the Linux operating system / kernel for some of its products, so that company now wants to know all the important things about how real-time operating systems / kernels compare with the Linux operating system / kernel, and that company has assigned you the task of writing a report on this subject and presenting your findings to the managers and technical staff of that company.

You are required to write a detailed comparison of real-time operating systems / kernels and the Linux operating system / kernel.

B. Requirements

(a) *An important requirement is that you should try to provide as many* ***detailed examples*** *as possible, and that your comparison should be as detailed as possible.*

(b) You should try to organize your report in a way such that it is easy to understand and use. The reader should be able to find information on a particular topic as quickly as possible, and be introduced to important concepts and issues at a "higher level" first, before getting into "lower level" details.

(c) The report must clearly identify which sources of information you have used in which components of this assignment.

(d) If a explanation on some aspect of real-time operating systems / kernels and the Linux operating system / kernel already exists in a book or paper that has been published by a publisher or posted on a website, you may include it together with the other explanations you have written yourself in your report, ***on the condition that you must clearly identify and attribute the source of each original individual existing explanation that you have either improved upon or included with or without modification; and explain in detail exactly which improvements you have made to the original, if any, in your report.***

You may assemble existing explanations to form a more complete explanation of one or aspects of real-time operating systems / kernels and the Linux operating system / kernel, or add your own improvements on existing explanations, ***on the condition that the***

source of each of the existing explanations is clearly identified and attributed, and you clearly identify which particular element(s) of the resulting assembly or particular element(s) of the resulting explanation are your own work. ***If you have written an explanation that cannot be found anywhere else, you should explicitly identify it as such, by writing in brackets that this is your own work and thoughts.***

(e) The report must contain a table of contents, and must be clearly divided into sections and subsections, with section and subsection headings. Page numbers must be included.

The format for the references in report, should be similar to the format of the references in the following paper:

http://www.csc.villanova.edu/~nadi/csc8710/papers/nooks.pdf

(f) Drawings, if any, must be produced electronically with a drawing program. All the drawings must be accompanied by figure numbers and captions.

C. What to Hand In

1. You are required to submit an electronic copy of the written report to the 3221Z W24 eClass folder titled "3221Z W24 Assignment 1".

2. The required format of the submitted written report is PDF.

3. Please note that the due date of Wednesday February 14, 2024, 23:59 for submitting the assignment CANNOT be extended. (Please note that this deadline also cannot be extended for students with accommodation letters, because according to the accommodation letters, flexibility regarding assignment deadlines only applies to "during periods of high course work volume and/or short turnaround times," which is not the case for this assignment.)

For any special circumstances, properly complete the "Request for Special Consideration" form and uploaded it to eClass within one week of the assignment submission deadline. By uploading that document properly, the weight of the missing report will be transferred to that of your final exam. Technical issues with your computer/internet, or having a heavy workload **are not considered as special circumstances**.

D. Evaluation of the Assignment

The weight of this assignment is 15% of your final course grade.

Your assignment will be evaluated according to:

(a) The quality, completeness, and originality of your comparison of real-time operating systems / kernels and the Linux operating system / kernel.

(b) The quality of the explanations/examples in the report that are your own work.

(c) The clarity, readability and organization of the report.

(d) How easy it is for the TA/marker to fully understand the explanations and examples in the comparison of real-time operating systems / kernels and the Linux operating system / kernel when reading the report.

(e) Whether your report satisfy the requirements in section B above.

E. Notes Regarding Academic Honesty

E1. Please note that this assignment must be completed independently by each student.

E2. Any form of collaboration or any form of collusion between each student and anyone else on this assignment is strictly forbidden.

E3. Please read very carefully York University Policies and the EECS Department Policies regarding academic dishonesty and plagiarism at:
http://www.cse.yorku.ca/admin/coscOnAcadHonesty.html

E4. Please be very vigilant about preventing academic dishonesty and plagiarism when completing this assignment, as the consequences of violating York University Policies and the EECS Department Policies regarding academic dishonesty and plagiarism can be very serious.

F. Notes Regarding Reference Sources

Please note that articles from websites that are outside of academia, cannot really be used to ***support*** your arguments, because such articles in general are NOT written by experts, and are NOT reviewed by other experts in the field, and for this reason, do not carry the same weight as peer-reviewed (refereed or scholarly) articles which are written by experts and are reviewed by several other experts in the field before the article is published in order to ensure the article's quality.
You should distinguish between peer-reviewed articles and non-peer-reviewed articles in your assignment. If you do reference articles from websites that are outside of academia, you should make it clear to the reader that the article is not as trustworthy as a peer-reviewed article. Note that all the sources that you reference must also be publicly available.

G. A Starting Point For Doing This Assignment

Note that this assignment is different from a programming assignment – the assignment does not require the writing of any programs. The writing of the assignment report should be more like writing a report when doing some technical research for a company; or more like writing a technical article to be published on the Internet for public knowledge; or like writing a chapter, or a section or subsection in a chapter of a book; where the article, report, or the chapter, or the section or subsection in the chapter of the book, attempts to explain as clearly as possible, and provide as many examples as possible to compare real-time operating systems / kernels and the Linux operating system / kernel.

As a starting point, you may read the following sections and chapter in the course textbook, A. Silberschatz, P.B. Galvin, G. Gagne, "Operating System Concepts," 10th Edition: (1) Section 1.10.6, "Real-Time Embedded Systems" p. 45-46; (2) Section 5.6, "Real-Time CPU Scheduling" p. 227-234; (3) Section 5.7.1, "Example Linux Scheduling" p. 234-239; (4) Chapter 20, "The Linux System" p. 775-819. You may also perform a Google search online using the key words "real-time operating system"; "real-time kernel"; and the key words "Linux operating system"; Linux kernel". It is your responsibility to search for, read, try to understand, and decide which additional material should be used for this assignment.

H. Notes Regarding Any Details That Are Not Explicitly Specified Above

Please note that the requirements specified in section B. Requirement above, are the ***minimum requirements*** that must be satisfied by your report. Obviously, there are many other possible details about what could be included to compare real-time operating systems / kernels and the Linux operating system / kernel that have been left unspecified. ***In general it is up to each individual student to make his/her individual judgment regarding details that are not explicitly specified above, such as what specific material to include in the report, the length of writing for each specific material/topic in the report, the total length of the report, how to organize and structure the material in the report, …, etc., and any other possible details about the report.***