

EN.605. 614 section 81

System Development in the UNIX Environment

Course Information

System Development in the UNIX Environment

EN.605. 614 81 (3.0 Credits)

Spring 2022 [AE Spring 2022]

Description

This course describes how to implement software systems in a UNIX (POSIX-compliant) operating system environment. Students will discuss and learn the complexities, methodologies, and tools in the development of large systems that contain multiple programs. Topics include an overview of the UNIX system and its general-purpose tools, advanced makefile usage, UNIX system calls, UNIX process management, threads, and basic and advanced interprocess communication. Additional topics include source code configuration control, Perl, and debugging techniques. Prerequisite(s): Familiarity with UNIX, experience with C++ or C.

Department: PE Computer Science

College: Engineering and Applied Science Programs for Professionals

Instructors



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Communication Policy :

Students are encouraged to contact us when you have questions. Preferably, if your question is general in nature, put your question in the "Problems and Questions" discussion area, and our answers will benefit the class. If you e-mail us at the e-mails above, be sure to identify the class (605.614) in the subject of the e-mail. If your need is urgent, you may also contact us by phone at our office during the week, or by using our mobile phone evenings and weekends. If you text us, be sure to identify yourself clearly in the text, by name and class.

Office Hours :

For more information regarding Zoom, please see the Zoom page located in Help & Support.

During the semester, we will be using Zoom to conduct "virtual office hours". This is a real-time software tool that will allow us to meet real time over the web, and includes voice over IP (VOIP) and other real-time features. We will be using this communication tool to conduct virtual office hours and, sometimes, a mini-lecture. These office hours sessions shall be recorded and a link to the recording will be posted in the calendar after the office hour session completes. You will be required to either attend the office hours session or listen to the recording.

Course Learning Outcomes (CLOs) :



By the end of the course, the student will be able to design and implement software systems consisting of multiple cooperating programs.

Required Text and Other Materials

Textbooks :

Stevens, W. R., & Rago, S. A. (2013). *Advanced Programming in the UNIX Environment*, 3/E, Addison- Wesley.

ISBN-10: 0321637739

ISBN-13: 978-0321637734

Other Materials & Online Resources :

Recommended

Mecklenburg, R. W., & Oram, A. (2005). *Managing projects with GNU make* (3rd ed.). Cambridge, MA: O'Reilly.

- ISBN-10: 0596006101
- ISBN-13: 978-0596006105

Schwartz, R. L., Phoenix, T., & Foy, B. D. (2017). *Learning perl* (7th ed.). Sebastopol, CA: O'Reilly.

- ISBN-10: 0596520107
- ISBN-13: 978-1491954324

Other References

Stevens, W. R. (1999). *Unix Network Programming - Volume 2: Interprocess Communications* (2nd ed.). Upper Saddle River, NJ: Prentice Hall PTR.

- ISBN-10: 0130810819
- ISBN-13: 978-0130810816

Bach, M. J. (1990). *The Design of the UNIX Operating System*. Englewood Cliffs, NJ: Prentice Hall.



- ISBN-10: 0132017997
- ISBN-13: 978-0132017992

Leffler, S. J. (1991). *The Design and Implementation of the 4.3 BSD UNIX Operating System*, Reading, MA: Addison-Wesley.

- ISBN-10: 0201061961
- ISBN-13: 978-0201061963

In the lecture notes of the course you may see asterisks (**) which will refer to references, or a "#" sign which will refer to a specific chapter or appendix in the referenced text.

Technical Requirements :

You should refer to **Support** on the course menu for a general listing of all the course technical requirements.

Evaluation and Grading

Student Coursework Requirements :

Preparation and Participation (Class Discussions)

Readings

There will be required textbook readings, as well as some optional readings from the recommended texts mentioned above, for each module. You are encouraged to complete the readings before working on the modules.

Class Discussions

There will be discussion questions associated with most modules throughout the semester. One post should be a post of your response to the original topic, and one post will be a response to a classmate. Your cogent participation in each Discussion will be worth 6 points (3 points for your original post, and 3 points for your follow-up post).

Our goal for the Discussion forums is that they will be a resource for the exchange of ideas. The Discussion forums are not supposed to be a place to post a longish essay which addresses the assigned question. Ideally, we wouldn't even post an initial question, actually - We would greatly prefer it if you (the general class) would post questions that you would like to see discussed. But, to help start a direction of discussion, We will be posting discussion questions with each module.

Here are some guidelines to keep in mind as you post:

1. Keep your posts, even your initial ones, concise and to the point. Another important point is that We do expect everyone in the class to read all the posts. As you are reading a long post, and wishing it was something easier and faster to read, remember your 20 paragraph post and what the other 19 students in the class are thinking of as they read your post.
2. Make sure your posts do not repeat what another student has posted. This will be easier to do if the above point is followed. If you are afraid that you might not be able to post something original if you are the 20th initial poster in the class, see the next suggestion. (Also, to help with this, in some modules We may split the class into smaller discussion areas of about 6 students each.)
3. If you have a discussion topic related to the module material that you would like to pose, please do! - even if it is quite different than the "assigned" discussion question. We will have particular appreciation for contributions of this sort. Please make sure, however, that your contribution is related to the module content.



4. Use external references. Don't copy from external references, but you can (and are encouraged) to include links to external references that support your discussion post, along with a summary in your own words on the external reference and how it supports your point. External references do include your text, the module content, and authoritative Internet links. It is more difficult to give full credit for posts with unsupported assertions or opinions.

Points will be assigned for each Discussion. More than two posts are certainly allowed and certainly encouraged, but only two posts (your best initial post and your best follow-up) will be used for your grade. Also, please be careful not to dominate the Discussion - let your fellow classmates have their shot at making contributions as well. Points are assigned to the each Discussion posts as follows:

Due dates for both the initial post and the follow-up are posted in the Calendar. Initial posts shall normally be due on Mondays at midnight, and followup posts shall be due the following Saturday night at midnight. Late posts will receive a 1 point deduction for each day (or part of a day) the required post is late.

There are assigned discussion questions in most weeks, and your participation is required. These discussion questions will emphasize and extend the lecture material. Your participation should consist of your supportable observations and opinions based on the text, outside materials, and even your past experiences.

We also hope that you will use the discussion area to share questions about particular problems you are having, and perhaps even help answer some questions posed by your classmates. A Discussion forum called Problems and Questions is set up for this kind of communication.

Ideally, you are expected to read all of the posts from your fellow students. However, with 20+ students in the class, it may be difficult to keep up. To ease that burden, We may split the class up into smaller groups to allow you to focus on a smaller group of posts. You are required to at least read the posts from your fellow students in your discussion group. If We do split the class into groups for a discussion, We will eventually make all the posts available to the class.

We will be reading your posts regularly, and We will assign grades to the posts as We read them (usually within 48 hours, but this is not guaranteed). Thus, if you get your post in early, you may be able to see the grade for the post before the due date. If you receive less than full credit, you can make additional posts for my consideration. Note that multiple posts do not 'add up', and a less-than 3 point initial post can only be mitigated by another initial post which would receive a higher grade; that second initial post would stand alone.

Zoom Participation

Note that attendance at Office Hours (mentioned previously) is not required; however, the office hours and mini-lecture shall be recorded. You are required to listen to the Zoom recording if you do not attend the office hours as they are held live.

Projects

There are five projects throughout the course. The first four of these projects shall be completed on the UNIX servers: dev4.jhuep.com and absaroka.jhuep.com. Each project is designed to build on one another; it is important to correct the errors in each assignment (after the grades are posted) so you don't make the same mistakes twice! Mistakes that are not fixed in the subsequent assignment shall receive a higher deduction than in the previous assignment.

When you complete the project on the UNIX system, you will submit your notification that the assignment is complete in Blackboard. Each project assignment will have explicit instructions on how you are to submit the assignment.

Project grades are reported to you via the Grade Center in Blackboard. Details on each deduction shall be provided. If that error applies to the next assignment, you should make sure to fix that error before the next assignment is submitted. If you aren't sure what the issue is, or are not sure how to fix it, be sure to ask.



The assignments should be compiled and run on the provided (UNIX) systems (dev4 and absaroka). The executable programs must be installed in the structure mandated in the last section of this document.

Problems or Questions - There will be a discussion topic for each project where you can post problems and questions that you have regarding each of these projects. Sharing these with classmates will be helpful to everyone, and We will be visiting this area regularly. Of course, you may also email me privately with questions as well.

Project Rules

1. The programs must be written in the 'C' or the 'C++' programming language.
2. A comment block at the the beginning of each program, library source file, and Makefile shall include the following information: the student, the course, the name of the file, and a short description of the file's purpose.
3. Your code must abide by the class-wide C Style Guide referenced in the Welcome under "Course Information." Points will be deducted for code that violates this Style Guide. (For rationale on why coding style is important in this class, refer to Module 2 on Make and Makefiles.)
4. No copying or plagiarism. If copying or plagiarism occurs, the person or persons involved will receive no credit. They will be treated as not having submitted the assignment. This includes copying assignments which you may find on the Internet that are similar to your assigned work.
5. Collaboration by students on the assignment is limited to the blackboard discussion boards, or by explicit permission of the instructor. You are not permitted to provide your code to another student, nor are you permitted to receive code from another student.
6. Assignments are due by midnight of the due date stated above. Your submission to Blackboard must be made before that time to avoid a late penalty. If the assignment is submitted late without prior arrangements (see #7 below) an automatic late penalty of 5% will be assessed with the additional 5% for each day or part of day late up to 10 days. After 10 days the assignment will be graded out of a total of 50 points.
7. Extensions are only granted if arrangements are made with the instructor well in advance of the due date of the assignment. No last-minute extensions will be given; if a student has not completed the assignment by the due date, the student has the choice of receiving a grade based on the work completed to that point, or receiving the initial 5% penalty plus the 5% penalty for each additional day (or part of a day) it takes to complete the assignment. In these cases, the assignment is not considered complete until the assignment is submitted via the Blackboard Course Module and the instructor is notified by the student of the completion of the assignment via e-mail. The extension time will be considered complete at the time of the submission.

Grading Policy :

Item	% of Grade
Preparation and Participation (Class Discussions)	20%
Quizzes	10%
Projects	70% (15% + 15% + 30% + 30% + 10% of this 70%)

- Preparation and Participation (Class Discussions) - There will be 12 discussion questions, at most one associated with each of the modules throughout the semester. Points are assigned for each Discussion as described above.
- Quizzes - There will be 10 on-line quizzes throughout the course. Each quiz is worth 100 points. Quizzes are normally due on Sunday nights at midnight as shown on the Calendar.
- Projects - There will be five projects throughout the course. Each project will be graded on a basis of 100 points. The first and second projects shall each be worth 15% of this total; the third and fourth shall each be worth 30%, and the last project shall be worth 10% of this 70%.

Overall Course Grade:



Score Range	Letter Grade
100-90	A
89-80	B
79-70	C
69-60	D
<60	E

Policies

Additional Resources :

Personal Wellbeing

If you are struggling with anxiety, stress, depression or other mental health related concerns, please consider connecting with the Johns Hopkins Student Assistance Program (JHSAP). If you are concerned about a friend, please encourage that person to seek out our services. JHSAP can be reached at 443-287-7000 or <https://jhsap.org/>

Tutoring Website

Johns Hopkins Engineering for Professionals offers a tutoring connection network that allows students to connect with other Johns Hopkins Engineering students or alumni for tutoring services. This service allows students to search a list of courses to "Find a Tutor" or complete a profile to "Become a Tutor." More information about this service can be found on the tutoring website (<https://tutor.ep.jhu.edu/>).



Deadlines for Adding, Dropping and Withdrawing from Courses

Students may add a course up to one week after the start of the term for that particular course. Students may drop courses according to the drop deadlines outlined in the EP academic calendar (<https://ep.jhu.edu/student-services/academic-calendar/>). Between the 6th week of the class and prior to the final withdrawal deadline, a student may withdraw from a course with a W on their academic record. A record of the course will remain on the academic record with a W appearing in the grade column to indicate that the student registered and withdrew from the course.





Academic Misconduct Policy

All students are required to read, know, and comply with the Johns Hopkins University Krieger School of Arts and Sciences (KSAS) / Whiting School of Engineering (WSE) [Procedures for Handling Allegations of Misconduct](#) by Full-Time and Part-Time Graduate Students.

This policy prohibits academic misconduct, including but not limited to the following: cheating or facilitating cheating; plagiarism; reuse of assignments; unauthorized collaboration; alteration of graded assignments; and unfair competition. Course materials (old assignments, texts, or examinations, etc.) should not be shared unless authorized by the course instructor. Any questions related to this policy should be directed to EP's academic integrity officer at ep-academic-integrity@jhu.edu.



Students with Disabilities - Accommodations and Accessibility

Johns Hopkins University values diversity and inclusion. We are committed to providing welcoming, equitable, and accessible educational experiences for all students. Students with disabilities (including those with psychological conditions, medical conditions and temporary disabilities) can request accommodations for this course by providing an Accommodation Letter issued by Student Disability Services (SDS). Please request accommodations for this course as early as possible to provide time for effective communication and arrangements.

For further information or to start the process of requesting accommodations, please contact Student Disability Services at Engineering for Professionals, ep-disability-svcs@jhu.edu.



Student Conduct Code

The fundamental purpose of the JHU regulation of student conduct is to promote and to protect the health, safety, welfare, property, and rights of all members of the University community as well as to promote the orderly operation of the University and to safeguard its property and facilities. As members of the University community, students accept certain responsibilities which support the educational mission and create an environment in which all students are afforded the same opportunity to succeed academically.

For a full description of the code please visit the following website: <https://studentaffairs.jhu.edu/policies-guidelines/student-code/>





Classroom Climate

JHU is committed to creating a classroom environment that values the diversity of experiences and perspectives that all students bring. Everyone has the right to be treated with dignity and respect. Fostering an inclusive climate is important. Research and experience show that students who interact with peers who are different from themselves learn new things and experience tangible educational outcomes. At no time in this learning process should someone be singled out or treated unequally on the basis of any seen or unseen part of their identity.

If you have concerns in this course about harassment, discrimination, or any unequal treatment, or if you seek accommodations or resources, please reach out to the course instructor directly. Reporting will never impact your course grade. You may also share concerns with your program chair, the Assistant Dean for Diversity and Inclusion, or the [Office of Institutional Equity](#). In handling reports, people will protect your privacy as much as possible, but faculty and staff are required to officially report information for some cases (e.g. sexual harassment).

