Lecture 01 - Introduction

ENSF461 - Applied Operating Systems

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Slides by Lorenzo De Carli, partly based on material by Robert Walls (WPI)

Welcome to the course!

Content of **today's lecture**:

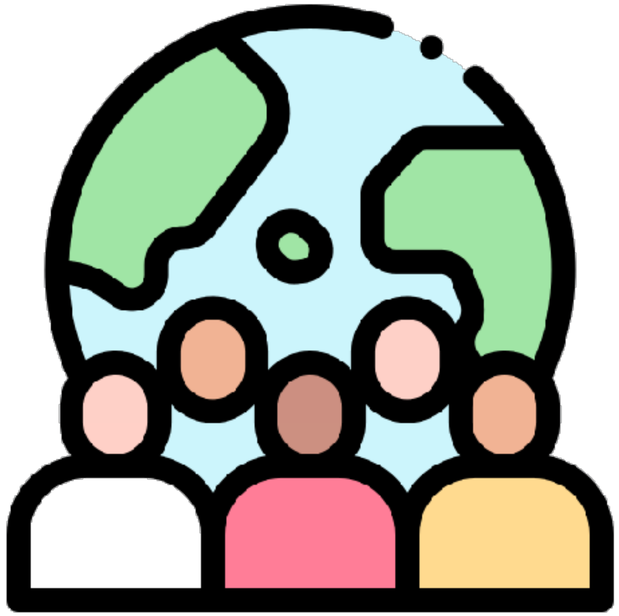
- Introductions
- Class logistics
- Overview of the course

Who am I?

Hani Mahmoud Mohammed, PhD

- Instructor, ESE
- PhD **University of Calgary**, 2020
- **Geomatics Software Developer** at **Hexagon Geosystems**

Who are you?



- Software Engineering Majors
- …at various points in your **student career**:
  - 2nd-year: 27
  - 3rd-year: 58
  - >3rd-year: 2

Let’s talk about class logistics

Components of the class

- In-person lectures
- Lab
- Evaluation
  - In-class quizzes
  - Lab projects
  - Midterm+final

In-person lectures

- Class meets **twice a week**
  - Mondays & Fridays, 11:00AM-12:15PM
  - ICT319
  - “Traditional” lecture
- Attendance is **mandatory** (more on this later)
  - Can skip up to four lectures w/o questions asked

Laboratory

- Meets **once a week**
  - Wednesday 11AM-1PM
  - ICT 319 too!
  - Hands-on graded exercises
- Attendance is **mandatory**
  - Can skip up to two labs w/o questions asked

What about grading?

In-class quizzes

- During **each lecture**, we'll pause for a few minutes to take an **online quiz**
- The quiz consists of a **small numbers of questions**
- **Topics:** current & previous lecture
- Can ask for **paper backup copy** if no laptop/phone available
  - In that case **bring a pencil**!

Let’s try a quiz (ungraded ;-))

D2L-> ENSF461 -> Assessment -> Quizzes -> Quiz 01

Lab projects

- In each lab you are going to be given a **programming exercise**
- You are going to:
  - Submit your **progress** at the **end of the lab**
  - Submit a **complete solution before the next lab**
- The progress submission is **required**

Must work in groups for the lab

- **Lab exercises** must be **tackled in groups of three**
  - Except **first lab**, which will be completed individually
- Must form groups **before second lab** (by Mon September 11th)
- If you don’t know who to pair with…
  - The system will automatically **randomly group unpaired students**
- Let me know if there is anyone **you would not like to be paired with**
  - Will keep it **confidential**!

More about pairing

- D2L is preconfigured with a group named “Team Projects”
- Once you find a teammate, **add yourself to any available group**
- Groups are limited to **two people**!
- **Working alone is not allowed** except under exceptional circumstances

Submitting your lab work

- We are going to use **GitHub classroom**
- You will receive an invitation to **join our virtual classroom**
- **Teams in GitHub** will be identical to **teams in D2L**
- There will be a **git repository** for each assignment
  - Upload your code there!

Grading lab projects

- You will need to:
  - Commit your initial work **before end of lab** (0-3pts)
  - Commit your complete work **before project submission deadline** (0-7pts)
- We will review **both**
- Both team members get the **same grade**!
- Deviations from the above will only be considered in **exceptional circumstances**

Midterm & final

- **Midterm:** evening, October 23rd (120 minutes)
- **Final:** during final session (120 minutes)
  - **No I don’t have control over the date of the final**
  - Final session runs until 12/20. If you booked travel before the final, **I can’t help you**
  - You can try to contact the registrar…

Grade computation

- **Midterm:** 30%
- **Final:** 40%
- **In-class quizzes:** 10% [4 lowest score dropped]
- **Lab exercises:** 20% [2 lowest score dropped]

Misc policies

Grading issues…

… must be brought up **timely!**

- We won’t consider altering an assignment grade **more than a week after the assignment was returned**, or **after final grades are due**
- Issues with grading must be accompanied by **objective evidence**
- “I believe my answer is correct based on lecture X material” **GOOD** 😍
- ”I feel I deserve more than grade Y” **BAD** 😱
- **Complaints of the latter form will not be addressed**

Absence policy

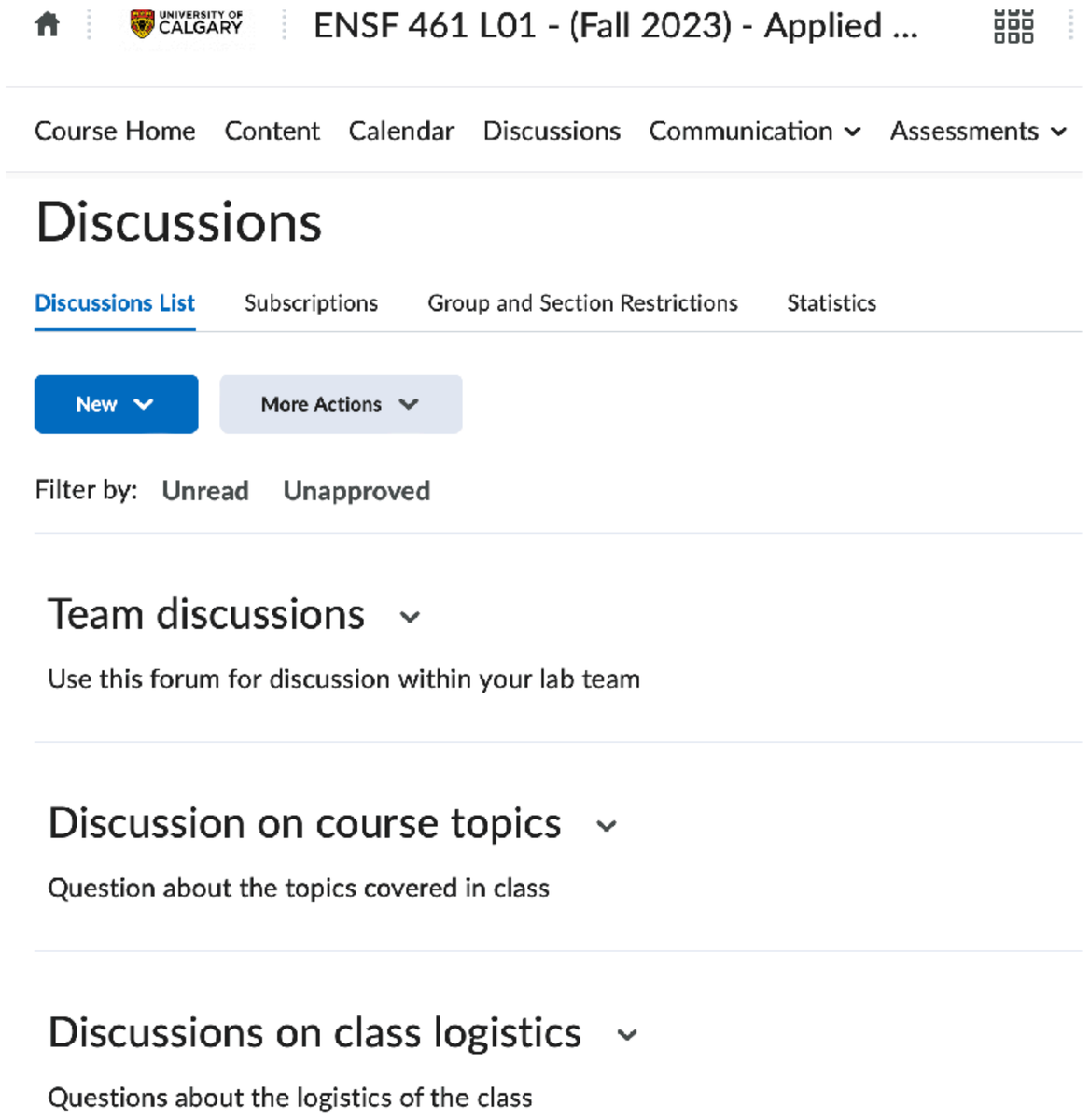
- You are expected to attend **all classes and all labs**
- **No exceptions**, but:
  - **Four lowest scores** for **in-class quizzes** dropped
  - **Two lowest scores** for **lab** dropped

Communication policy

- Preferred approach: **question in class and/or office hours**
- If that does not work, **ask in the discussion board**
- If that does not work, **email TAs or instructors**
- Email is also the **preferred method** for logistics-related questions, grading questions, etc.
- Instructors and TAs will make a best effort to reply to all emails within **2 business days**

Discussion board?

- You can find it in **D2L**, under “Discussion”
- You will find **forums** for:
  - Intra-team discussions
  - Questions on course topics
  - Questions on logistics



Late submission policy

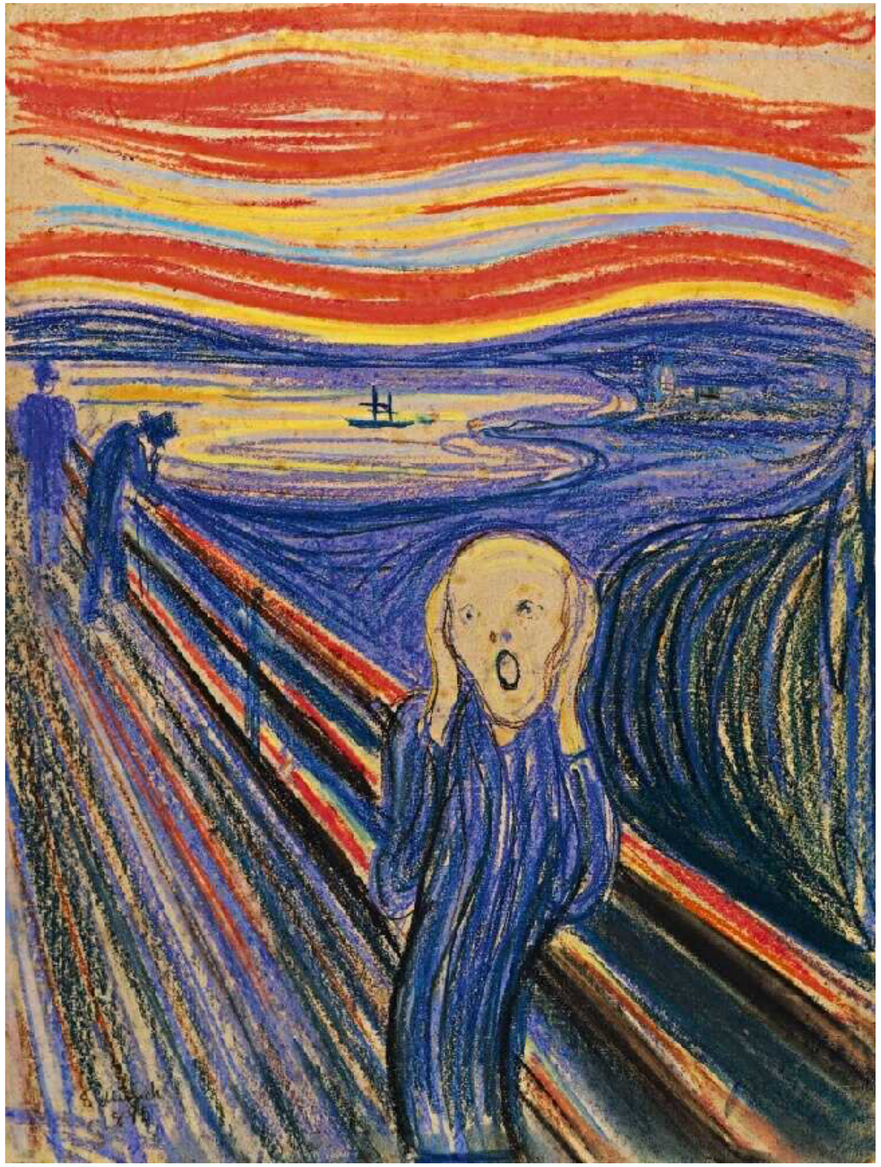
- Deadlines are communicated **well in advance**
- …thus, **late assignments won't be graded**
- If you want to request an exception, you must be able to document **exceptional circumstances** (contact instructor within 24 hours)
- It is your responsibility to be able to attend the **midterm/final**
  - We will provide **makeup session** for the midterm (exceptional circumstances)
  - For the final, can request a **deferred session** if needed

Plagiarism, misconduct…
ARE BAD!

- **Reason #1:** you won't be able to learn what you are supposed to
- **Reason #2:** you will find yourself under disciplinary action
- **Most cases involve one of:**
  - Having someone else do the work for you
  - Copying/pasting stuff from the internet, particularly w/o citing the source
- **University Policy on misconduct:** https://www.ucalgary.ca/student-services/student-success/learning/academic-integrity

Respectful behaviour

- **Disrespectful behaviour** towards **classmates**, **TAs**, **instructors** will result in **automatic and immediate failing grade**, regardless of performance in assignments



Course content

Why study operating systems?

- Well, **what is an operating system?**
- ...

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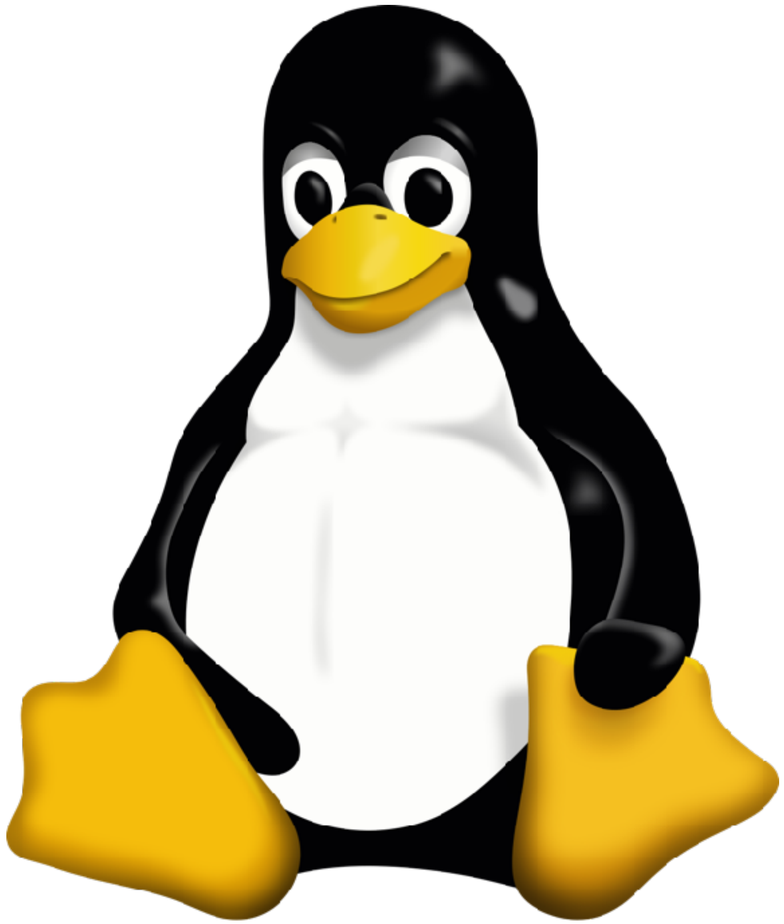
- **...**

- **Paraphrasing from the book:** “A body of software responsible for making it easy to run programs, allowing programs to share memory, enabling programs to interact with devices, and other fun stuff like that”
- Mostly, **virtualize** machine resources so multiple concurrent programs can **access and use them**
- **Core component of modern computing systems!**

The ⭐ of this course: Linux

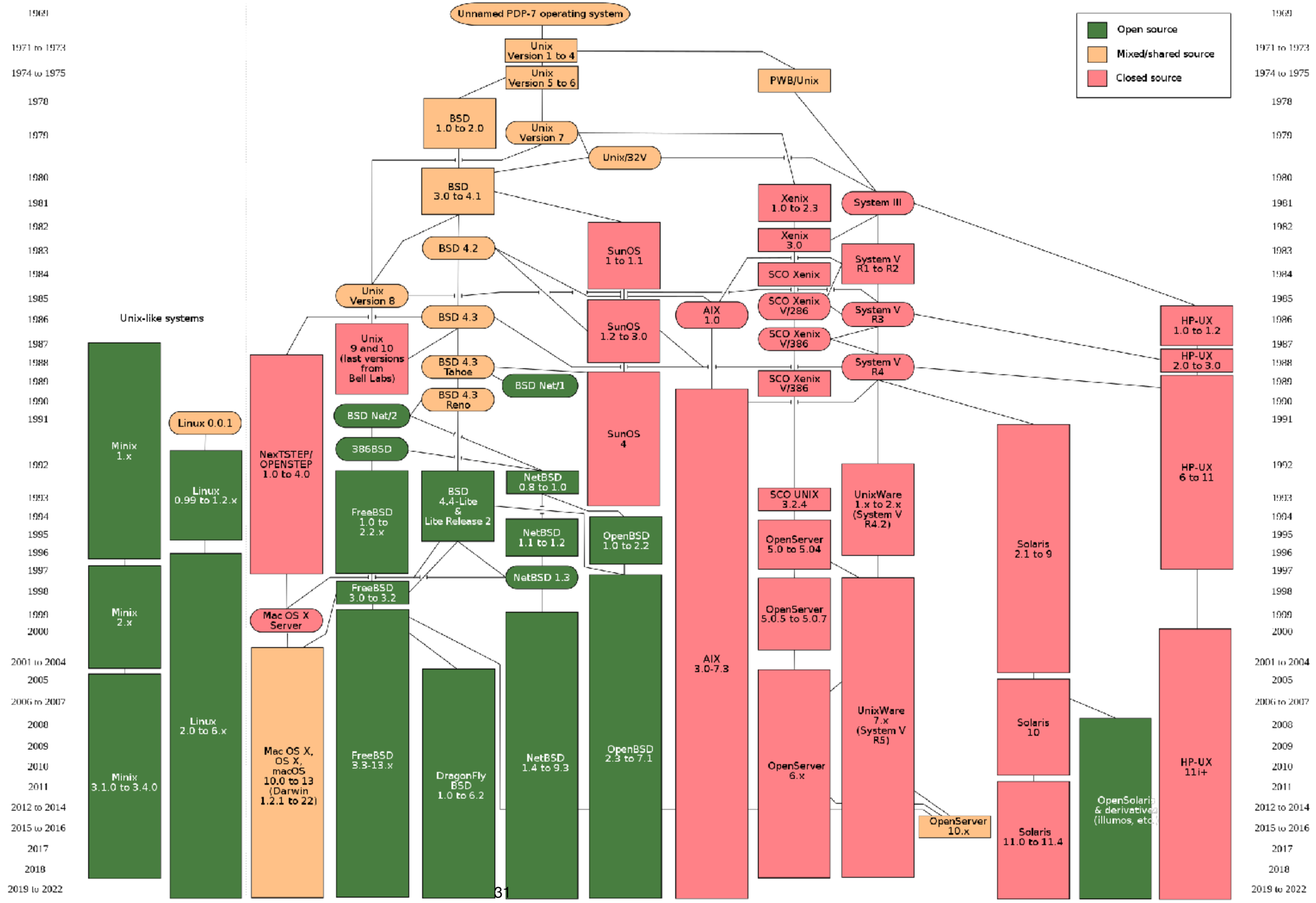


- We are going to review **general operating system concepts** in the context of **Linux**
- What you learn will be:
  - **Directly applicable** on **Linux** and derived OS'es
  - **Conceptually relevant** to how **other OS'es** do things

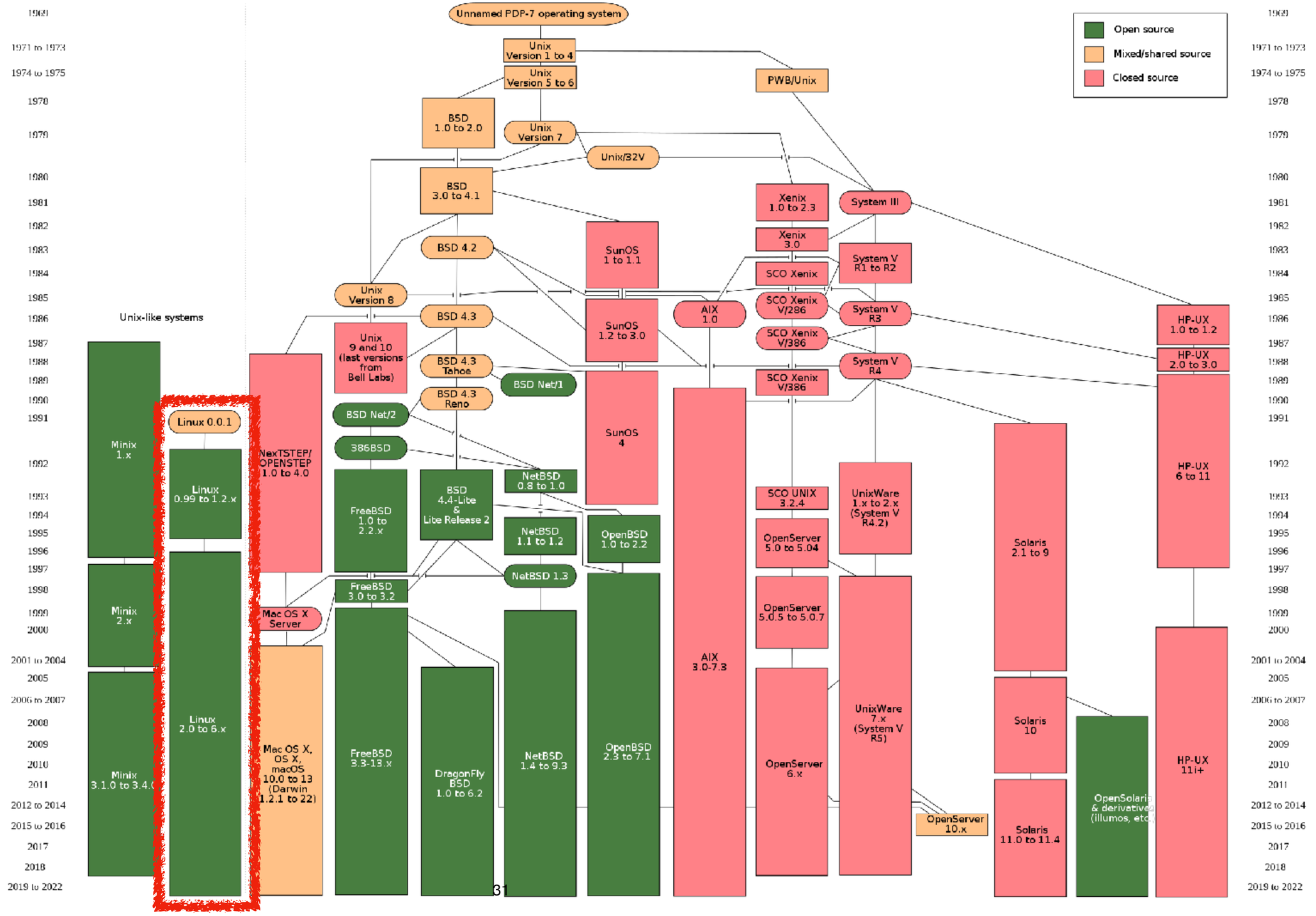
Why Linux?

- Linux is **open-source** thus information on how it works are **directly accessible**
- Several other operating systems are based on Linux:
  - Android
  - RTLinux
- Other operating systems have “common ancestry”:
  - MacOS
  - iOS

A little (OS) history



A little (OS) history



Oh the topics that we'll cover

- Learn the command line (3 lectures)
- OS overview (2)
- Task scheduling (2)
- Memory management (4)
- Concurrency (4)
- I/O (2)
- Special topics (2)

hotpot.ai/art-generator

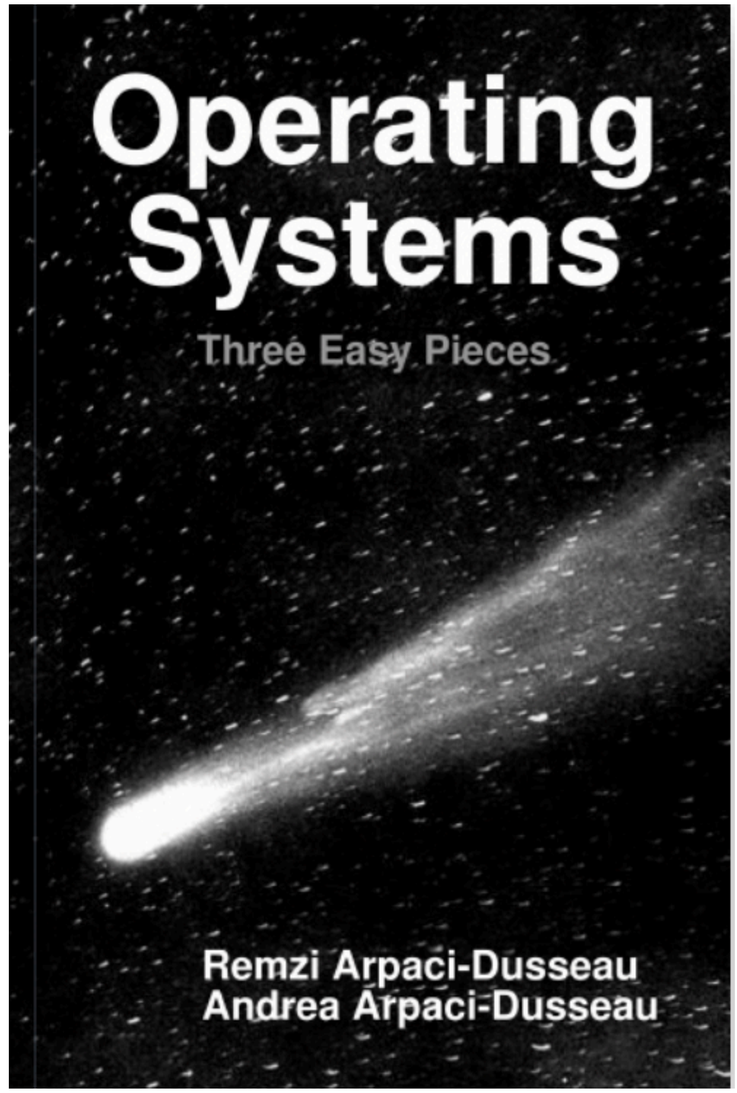
What happens next?

- We are going to begin this class with some **hands-on experience**
  - Creating a Linux installation
  - Run basic tasks on the command line
  - Write and compile programs
- After that, we are going to get into **more theoretical topics**

What about the book?

We'll do something slightly different…

- We'll be using a **free online book** by two very well-known OS researchers
- **Popular choice** for OS classes
- **Free** at https://pages.cs.wisc.edu/~remzi/OSTEP/



Finally, credit where is due…

- This class is largely based on material by **Robert Walls**, WPI, Massachusetts
- Robert is a **great teacher** and a skilled **system security researcher**
  - Also a former colleague
- But no worries! **Mistakes/issues** are 100% mine :-)

That’s all!