



Lecture 1

Let's introduce ourselves!

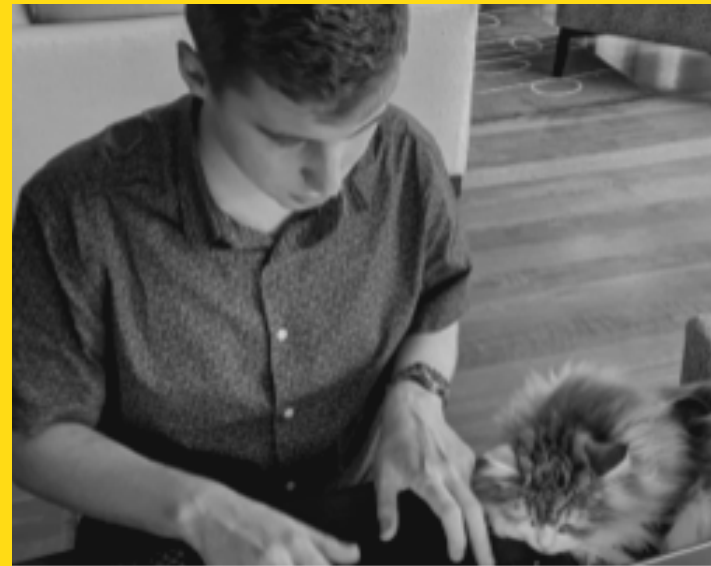


TODAY...

- Welcome and Introductions
- Course Administration
- How COMP1511 works
- How to get help and the best ways to approach learning Programming
- What is programming?
- What is Linux and working in Linux
- A first look at C

WHO IS THE 1511 TEAM?

GET TO KNOW US



TOM KUNC

Admin extraordinaire
Has a script for everything



**DR SASHA
VASSAR**

Course convenor/Lecturer
in Charge
Loves dogs



SHREY SOMAIYA

Admin extraordinaire
Always awake

Our wonderful team of tutors



https://cgi.cse.unsw.edu.au/~cs1511/21T3/resources/meet_the_team.html

Course webpage

All course information can be found HERE (not Moodle!)

<https://cgi.cse.unsw.edu.au/~cs1511/21T3/>

COMMUNICATION

COURSE ADMIN RELATED

- Email the course email for all admin related enquiries:
cs1511@cse.unsw.edu.au
- For any ENROLMENT issues:
UNSW Nucleus Student Hub
<https://nucleus.unsw.edu.au/en/contact-us>

COMMUNICATION

COURSE CONTENT RELATED

Course Forum

- you should have received an email invite to this)
- Post all your questions here and feel free to answer other's questions

<https://discourse.cse.unsw.edu.au/21t3/comp1511/>

COMMUNICATION

COURSE CONTENT RELATED

- Ask questions in tutorials/labs
- Help Sessions
 - Schedule will be announced
 - Good place to get help outside of normal lab/tutorial times

WHAT IS PROGRAMMING?

- Computers can only follow instructions that we give them to solve problems
- Writing a program is providing the computer with a set of instructions
- Problem solving is a very important skill, can only be built up with practice!



COURSE FORMAT

We assume no prior knowledge
& zero previous programming
experience

We teach you the fundamentals
of programming, how to
approach and solve problems,
and how to talk to computers in
a common language

LECTURES

TWO HOUR SESSION TWICE A WEEK

- Streamed online via YouTube Live (recordings will be available)
 - Tuesday 10am–12pm (AEDT)
 - Wednesday 12pm–2pm (AEDT)
 - Week 6 is Flex Week, so no formal lectures
- If you have a question, feel free to ask in live chat, we often have tutors in the chat to help answer
- Please be respectful of others at all times – everyone is here to learn.

LECTURE CONTENT

- Theory – What are we trying to understand?
- Demonstrations – Some live coding to show you how some things work
- Problem Solving – How do we decide what to code?
- Other stuff – Outside of programming, what's important?

Lecture slides (and other materials) are available from the Course Website:

<https://cgi.cse.unsw.edu.au/COMP1511/21T3/>

Lecture recordings will be in the YouTube playlist and linked via the Course Website

TUTORIALS

ONE HOUR CLASSROOM ENVIRONMENT

- Go further in depth into the topics we're teaching
- Actual practical working of tasks and problems we've given you
- Learning how to solve problems before you write the code!
- Tutorial Questions will be available in advance of the tutorials

TUTORIALS

ONE HOUR CLASSROOM ENVIRONMENT

"Tutorials are a good place for interactive learning. You'll have time to discuss and work through problems there."

- Online classes use Blackboard Collaborate
- Please turn on your cameras if you can
- We love seeing pets make an appearance (you will see/hear my dogs consistently...)
- Sample answers released after the last tutorial for the week
- Revision questions available also

LABS

**TWO HOUR SESSION
COMES DIRECTLY
AFTER TUTORIAL**

- Practical coding including working in small groups
- Time to have one on one conversations with your tutors
- Lab exercises will be marked automatically and count towards your final marks (10%)
- There are challenge exercises for earning bonus marks (not necessary and some are hard enough that they'll eat up a lot of time)
- Tutorials and Labs do not run in Week 6

ASSIGNMENTS

LARGER SCALE PROJECTS

"Start the assignments early, so that you have time to chip away and get help as needed."

- Individual work
- These will take you a few weeks and will test how well you can apply the theory you've learnt
- There are two Assignments due in Weeks 6 and 10
 - Late penalties of 1% per hour apply (this reduces your maximum possible mark)
- Assignment 1 is worth 15% of your final mark
- Assignment 2 is worth 25% of your final mark

HELP SESSIONS

OPTIONAL SESSIONS SCHEDULED DURING THE WEEK

*"A great place to ask questions
and get help to fill any gaps."*

- Also held using Blackboard Collaborate
- Some one on one consultation with tutors
- Time for you to ask individual questions or get help with specific problems
- Schedule will be up on the Course Website soon
- These are particularly busy around Assignment deadlines

WEEKLY PROGRAMMING TESTS

PROGRAMMING TESTS WEEK 3-10

- Attempt with time limit of 1 hour
- Done in your own time and under self-enforced exam conditions
- A way to be honest with yourself about progress and ability to see what concepts may need further revision and practice
- After 1 hour, can keep working
- Automarked – partial marks are given
- Contribute 10% of final mark
- Violation of test conditions, can lead to a zero mark being given for the whole component

FINAL EXAM

TAKE-HOME OPEN-BOOK EXAM

- Expected workload of around 3–5 hours total
- You'll be given a series of problems to solve in C
- You will also be expected to read some C and show you understand it
- There will also be some questions covering programming ideas

Exam Hurdles

- Parts of the exam are competency hurdles
- These questions must be answered correctly to pass the course

TOTAL ASSESSMENT

Labs – 10%

Weekly tests – 10%

Assignment 1 – 15%

Assignment 2 – 25%

Final Exam – 40%

To pass the course you must:

- Score at least 50/100 overall
- Solve problems using arrays in the final exam
- Solve problems using linked lists in the final exam

SPECIAL CONSIDERATION

Special Consideration:

- Support for any issues that make it difficult for you to study
- <https://student.unsw.edu.au/special-consideration>
- You can apply now if you have existing reasons (or later if something comes up)

**If you have an ELP plan, please
email it directly to me:
a.vassar@unsw.edu.au**

SUPPLEMENTARY ASSESSMENT

A Supplementary exam can be offered to students granted Special Consideration for the exam

- Fit-to-Sit rule
- Identical in format to the main exam

CODE OF CONDUCT

This course and this University allows all students to learn, regardless of background or situation

Remember the one rule . . . you will not hinder anyone else's learning!

Anything connected to COMP1511, including social media, will follow respectful behaviour

- No discrimination of any kind
- No inappropriate behaviour
 - No harassment, bullying, aggression or sexual harassment
- Full respect for the privacy of others

PLAGIARISM

"If you don't spend the time to learn and practice the content, the only person who loses is you."

- Plagiarism is the presentation of someone else's work or ideas as if they were your own.
- Any kind of cheating on your work for this course will incur penalties (see the course outline for details)
- Collaboration on individual assessments like Assignments is considered plagiarism

COLLABORATION VS PLAGIARISM

"Discussion of work and algorithms is fine (and encouraged)."

- The internet has a lot of resources you should learn to use, just make sure you credit your sources
- No collaboration at all on individual assignments
- Your submissions are entirely your own work
 - Don't use other people's code
 - Don't ask someone else to solve problems for you (even verbally)
 - Don't provide your code to other people
- At best, you'll lose the marks for the particular assignment
- At worst, you'll be asked to leave UNSW
- And even worse . . . you won't learn what you paid all this money and time to learn

IF YOU WANT MORE INFO . . .

- Reading
 - Course webpage
 - Course forum
- Recorded Lectures (replay YouTube Streams or via Moodle)
- One on One
 - Ask your tutor during lab sessions
 - Help Sessions
- Serious Issues
 - Email cs1511@cse.unsw.edu.au
 - The Nucleus (student hub: nucleus.unsw.edu.au)
 - CSE Help Desk
(<http://www.cse.unsw.edu.au/~helpdesk/>)

LEARNING IS HARD...

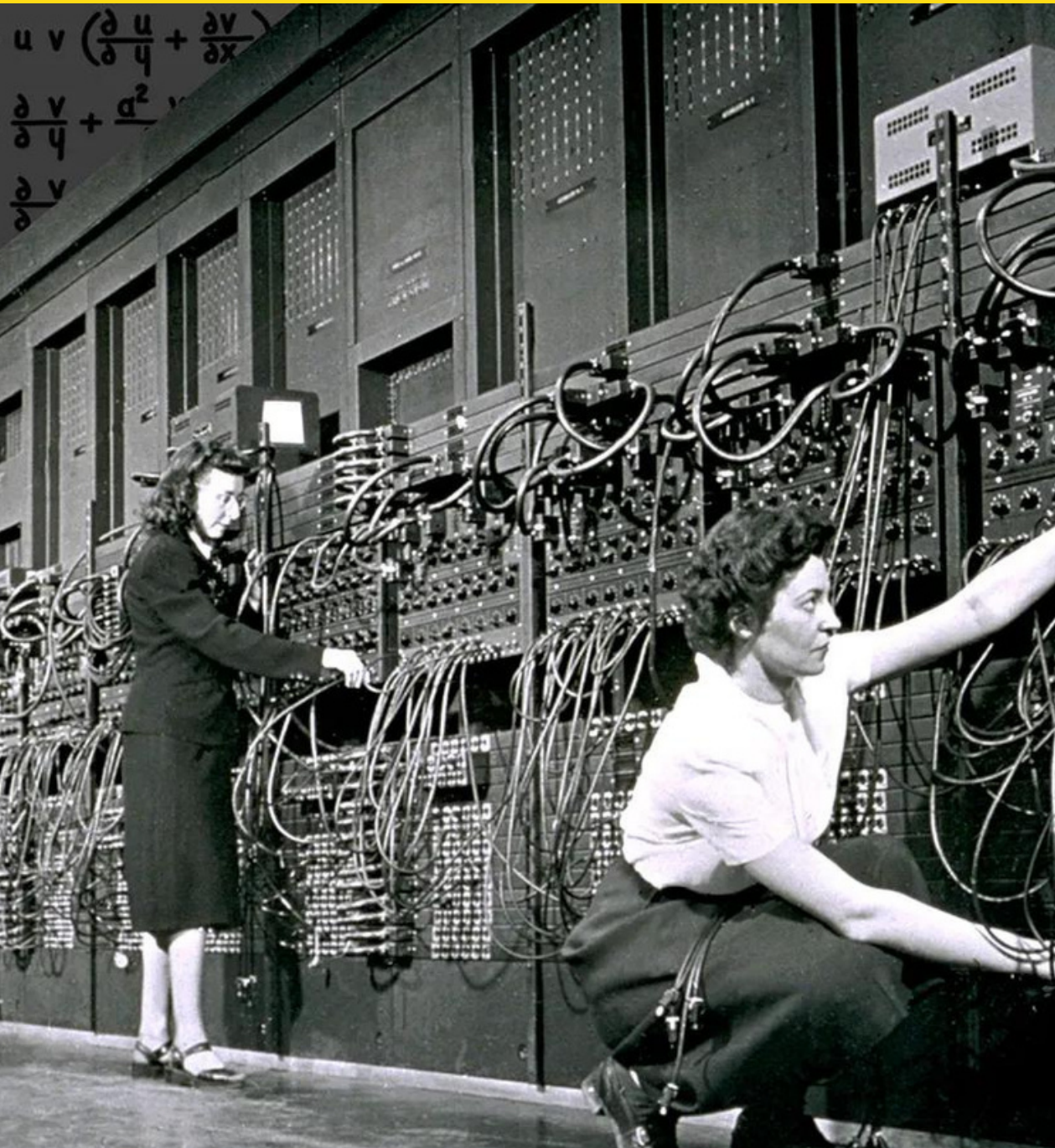
"Learning programming is a secondary skill (like many others!) - it is not intuitive like learning how to speak..."

Secondary skills are learnt slowly and with conscious and deliberate effort. It is not magic and it will not happen overnight, you have to keep practising and building up your knowledge base. Don't feel disheartened if you do not understand something first go - try and try again, get help, let us know if there is something that is just not making sense. Make sure to attempt all your labs questions and assignments, working through these problems will help you build an understanding of how to solve similar problems, and how to use code to solve these.

BREAK TIME (5 MINUTES)

Time to stretch your body and mind in this
five minute break

Fun riddle: Suppose you have two
buckets. One of these is 3L in capacity
and the other one is a 5L bucket. How
could you measure exactly 4L using only
those buckets and as much extra water as
you need?



<https://spectrum.ieee.org/untold-history-of-ai-invisible-woman-programmed-americas-first-electronic-computer>

WHAT IS A COMPUTER?

A tool . . . a machine . . . the love of my life...

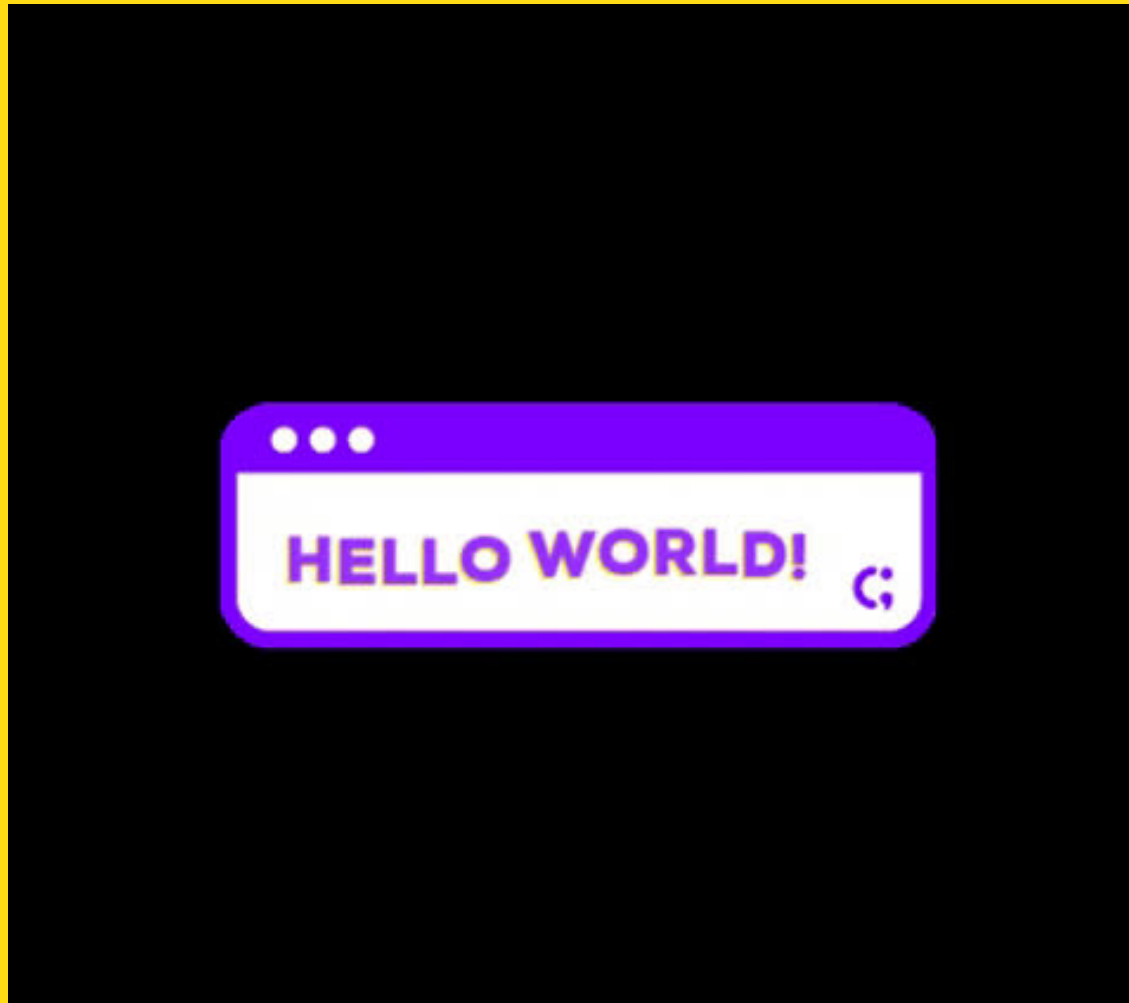
THE ULTIMATE TOOL IN ITS ABILITY TO BE RECONFIGURED FOR DIFFERENT PURPOSES.

The key elements:

- A processor to execute commands
- Memory to store information

WHAT IS PROGRAMMING?

```
var scrollHeight = element.clientHeight + 0.02 * window.innerWidth;  
window.scroll(0, scrollHeight);  
}
```



WHAT IS PROGRAMMING ACTUALLY?

- Providing a computer with specific instructions to solve various problems
 - Using specific languages to write those instructions (code)

WHAT IS PROGRAMMING ACTUALLY?



- At the core of it – problem solving!
- You may go through many iterations before you get it right – mistakes are good!

```
graph TD; A[your code] --- B[Operating System]; B --- C[Computer Hardware];
```

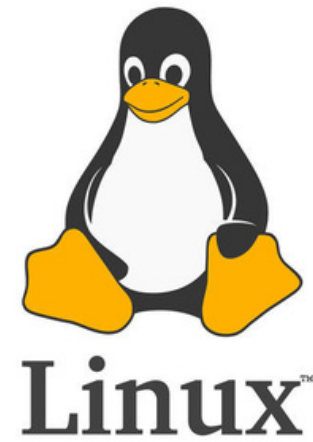
your
code

Operating
System

Computer
Hardware

WHAT IS AN OPERATING SYSTEM?

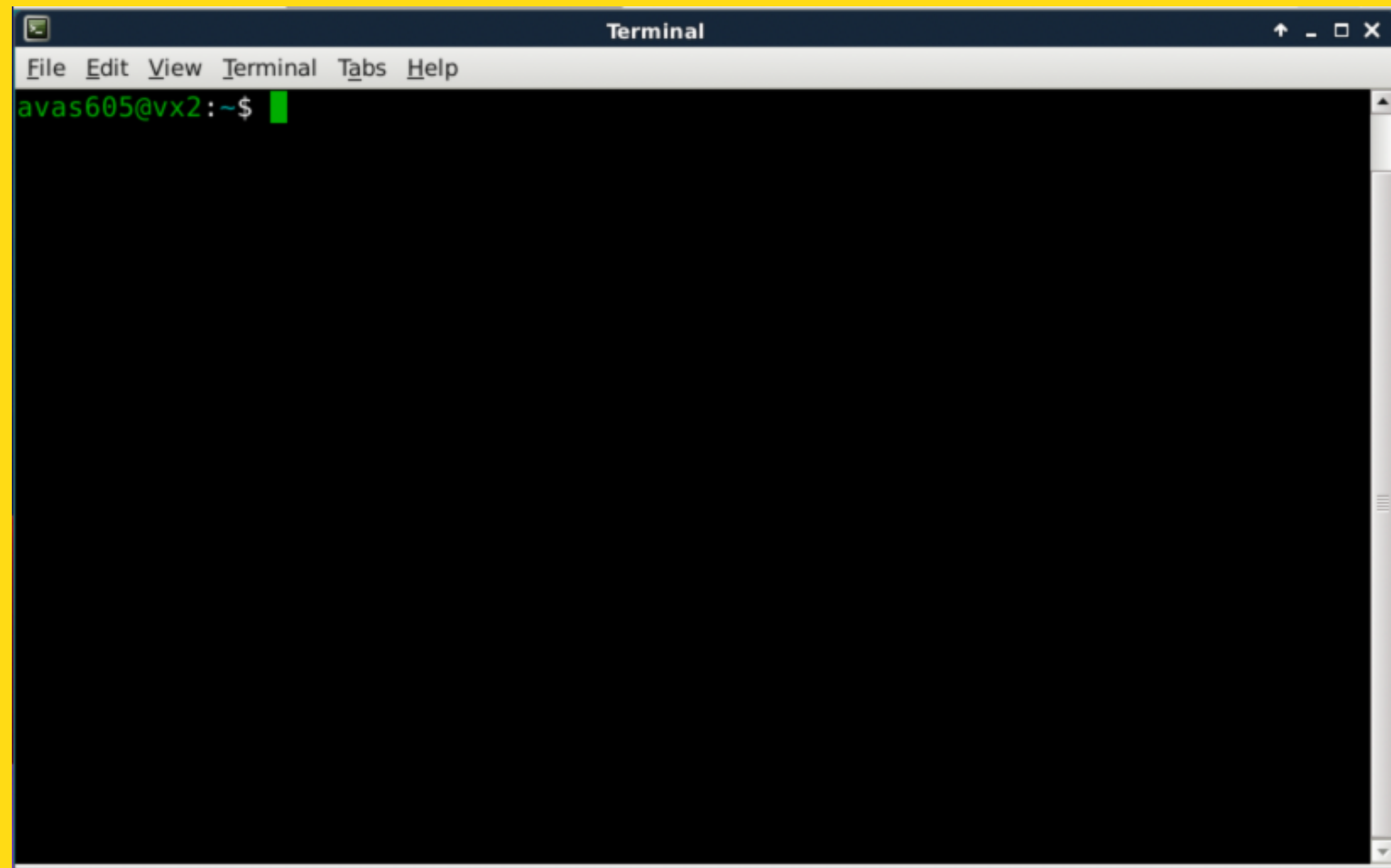
- An Operating System is the interface between the user and the computer hardware
- Operating Systems:
 - Execute user programs and make solving problems easier
 - Make the computer system convenient to use
- Basically, an Operating System sits between our code and the computer, providing essential services



WHAT IS LINUX AND WHY?

- Linux is a Unix-based operating system:
 - Open source
 - More reliable
 - Lightweight
 - Faster, and
 - More secure

WHAT IS TERMINAL?



- Terminal (command line driven) allow us to send simple text commands to our computer to help navigate directories, copy files, etc.
- Back in the day this was the only way to communicate with the computer!
- A Terminal is the main interface to Linux
- This means all our interaction is in text...

SOME IMPORTANT TERMINAL COMMANDS

- **ls**
 - Lists all the files in the current directory
- **mkdir *directoryName***
 - Makes a new directory called *directoryName*
- **cd**
 - Changes the current directory
- **pwd**
 - Tells you where you are in the directory structure at the moment

COMMAND LINE AND FILE OPERATIONS

File operations on the command line

- cp source destination - copy
- mv source destination - move (can also be used to rename)
- rm filename - remove a file (delete)

The -r tag can be added to cp or rm to recursively go through a directory and perform the command on all the files

- Eg: "cp -r COMP1511
COMP1511_backup" will copy all
files from my COMP1511 directory
to my COMP1511_backup directory

USING CSE'S COMPUTING RESOURCES

Our labs are running Linux with the basic tools necessary to get started

You will definitely want to get your own computer ready to code with:

- VLAB allows you to remotely use CSE's resources – instructions on setting this up available in the first laboratory
- Visual Studio Code with SSH to connect to CSE –
<https://www.cse.unsw.edu.au/~learn/homecomputing/vscode>
- or – You can set up a programming environment on your own computer (check the course website for links to guides)

WHAT THE BASICS LOOK LIKE

For COMP1511 we need:

- A text editor (like gedit)
 - A basic text editor
 - Helps out a little by highlighting C in different colours (after you run 1511 setup command in lab01)
- A compiler (we use dcc)
 - A translator that takes our formal human readable C and turns it into the actual machine readable program
 - The result of the compiler is a program we can "run"

You can use VLAB to access CSE's editor and compiler

PROGRAMMING IN C

**PROGRAMMING IS
LIKE TALKING TO
YOUR COMPUTER**

We need a shared language to be able to have this conversation

We'll be looking at one particular language, C and learning how to write it. C is:

- A clear language with defined rules so that nothing we write in it is ambiguous
- Many modern programming languages are based on C
- A good starting point for learning how to control a computer from its roots

LET'S C SOME C

**SORRY, I COULDN'T
HELP MYSELF...**

```
// A demo program showing output in C  
// Sasha Vassar, July 2021 Hello!
```

```
#include <stdio.h>
```

```
int main(void) {  
    printf("Hello!\n");  
    return 0;  
}
```

BREAKING IT DOWN INTO PARTS

HEADER

```
// A demo program showing output in C  
// Sasha Vassar, July 2021 Hello!
```

Words for humans

- Half our code is for the machine, the other half is for humans! (roughly)
- We put “**comments**” in to describe to our future selves or our colleagues what we intended for this code
- `//` in front of a line makes it a comment
- If we use `/*` and `*/` everything between them will be comments
- The compiler will ignore comments, so they don't have to be proper code

BREAKING IT DOWN INTO PARTS

#INCLUDE IS A SPECIAL TAG FOR OUR COMPILER

```
#include <stdio.h>
```

- It asks the compiler to grab another file of code and add it to ours
- In this case, it's the Standard Input Output Library, allowing us to make text appear on the screen (as well as other things)
- Almost every C program you will write in this course will have this line

BREAKING IT DOWN INTO PARTS

THE "MAIN" FUNCTION

```
int main(void) {  
    printf("Hello!\n");  
    return 0;  
}
```

A **function** is a block of code that is a set of instructions

Our computer will run this code **line by line**, executing our instructions

- The first line has details that we'll cover in later lectures
 - int is the output - this stands for integer, which is a whole number
 - main is the name of the function
 - (void) means that this function doesn't take any input

BREAKING IT DOWN INTO PARTS

THE "MAIN" FUNCTION

```
int main(void) {  
    printf("Hello!\n");  
    return 0;  
}
```

Between the { and } are a set of program instructions

printf() makes text appear on the screen. It is actually another function from `stdio.h` which we included.

return is a C keyword that says we are now delivering the output of the function. A main that returns 0 is signifying a correct outcome of the program

EDITING AND COMPIRATION

LET'S TRY THIS IN OUR EDITOR AND COMPILE IT

```
// A demo program showing output in C
// Sasha Vassar, July 2021 Hello!

#include <stdio.h>

int main(void) {
    printf("Hello!\n");
    return 0;
}
```

In the linux terminal we will open the file to edit by typing:

gedit helloWorld.c &

Once we're happy with the code we've written, we'll compile it by typing:

gcc helloWorld.c -o helloWorld

The -o part tells our compiler to write out a file called "helloWorld" that we can then run by typing:

./helloWorld

The ./ lets us run the program "helloWorld" that is in our current directory

AND WE ARE OFF!

WE NOW HAVE OUR FIRST WORKING PROGRAM...

- Try this yourself!
- Try it using VLAB via your own computer
- Try setting up a programming environment on your own computer (differing levels of difficulty depending on your operating system)



WHAT DID WE LEARN TODAY?



ADMIN

How COMP1511 is run

RESOURCES

Where to find resources
(course webpage and
forum)

HELP!

How to get help and best
ways to approach
learning programming

WHAT IS ?

What is programming?
What is an Operating
System? What is Linux?

LINUX

Some basic Linux
commands to get you
started

FIRST C

Our first program

ANY QUESTIONS?

**DON'T FORGET YOU CAN
ALWAYS EMAIL US ON
CS1511@CSE.UNSW.EDU.AU
FOR ANY ADMIN QUESTIONS**

**PLEASE ASK IN THE FORUM
FOR CONTENT RELATED
QUESTIONS**

