Unix Shell

Technical Tuesdays

Bala

Technical Tuesdays

Objectives

Introduction but **not a tutorial**

Tell people what is already there and **what is possible**

Give some **examples** for inspiration

Provide a **minimum viable environment** for
further learning and exploration

Technical Tuesdays

Introduction
15 Oct

*nix Shell
22 Oct

R Scripting
29 Oct

Python
12 Nov

JavaScript
19 Nov

Databases
26 Nov

Version Control
03 Dec

Mapping
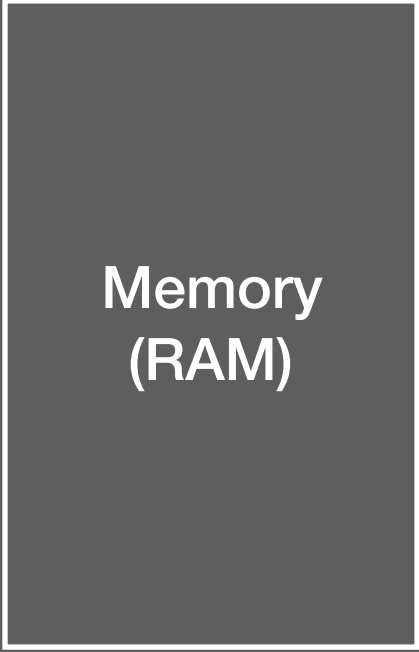10 Dec

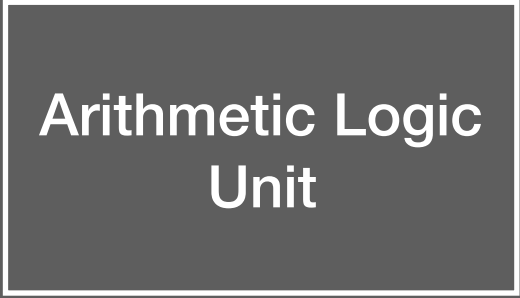**j.t.vandijk@ucl.ac.uk**

Overview

Context - Where does all of this come from?

Utility - For what these things are used?

Relevance - How can I use these for my purposes

Resources - Where can I learn more?

Recap

Registers	
Register A	Register B
Register C	Register D

Arithmetic Logic Unit

Control Unit

Memory (RAM)

1000 0111
1100 1000
0011 1010
1000 1001
1100 1001
0011 1011
0101 0001
1101 0010
0000 0000
0000 0000

Recap

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Recap

Hardware

Registers

| Register A | Register B |
| Register C | Register D |

Arithmetic Logic Unit

Control Unit

Memory (RAM)

Software
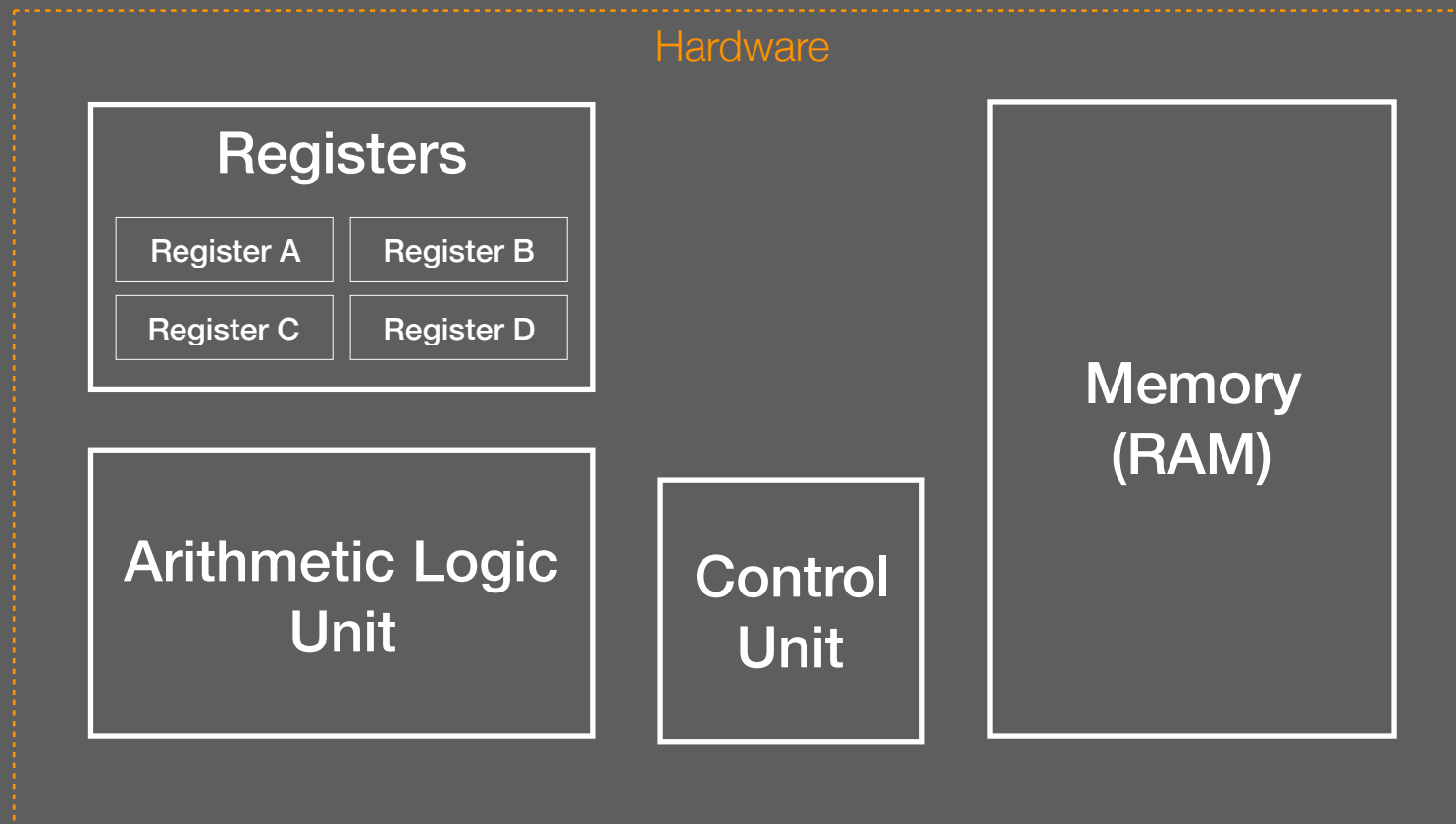
1000 0111
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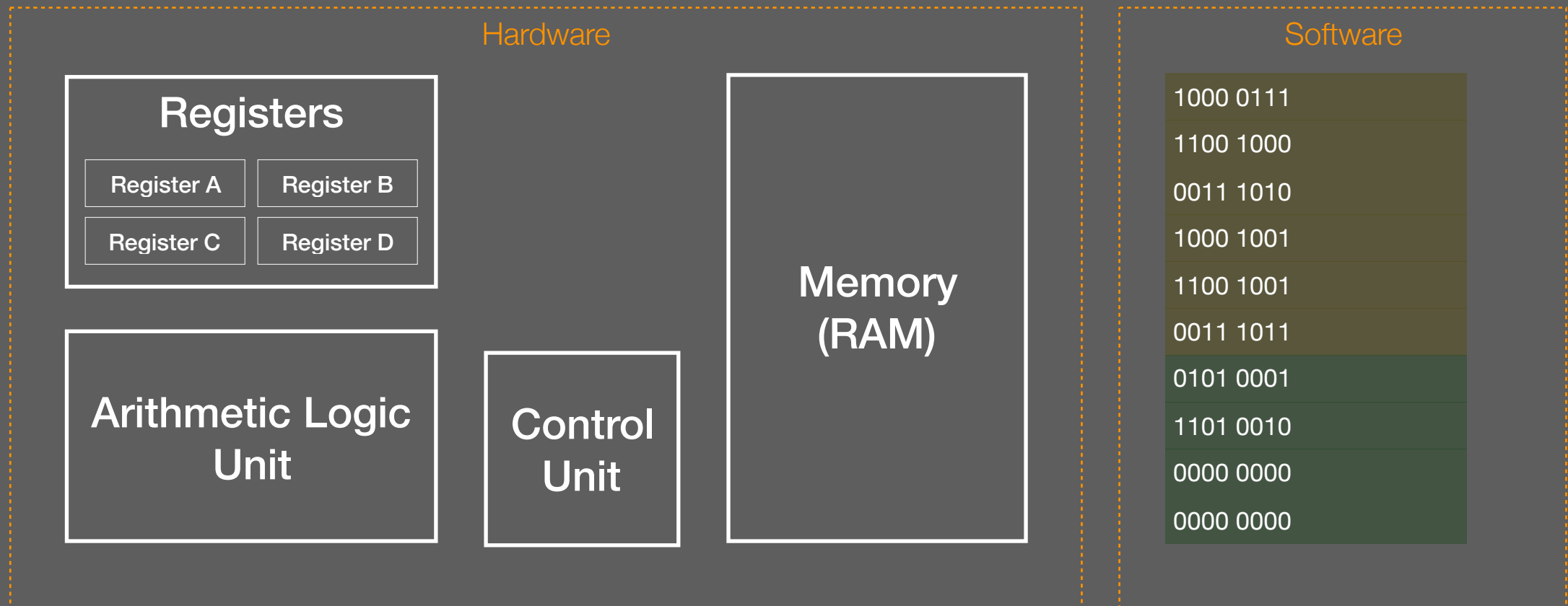
Recap

Hardware ← **Programs**

Operating System

```
┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│              │ ◄── │  Operating   │ ◄── │              │
│   Hardware   │     │    System    │     │   Programs   │
│              │     │              │     │              │
└──────────────┘     └──────────────┘     └──────────────┘
```
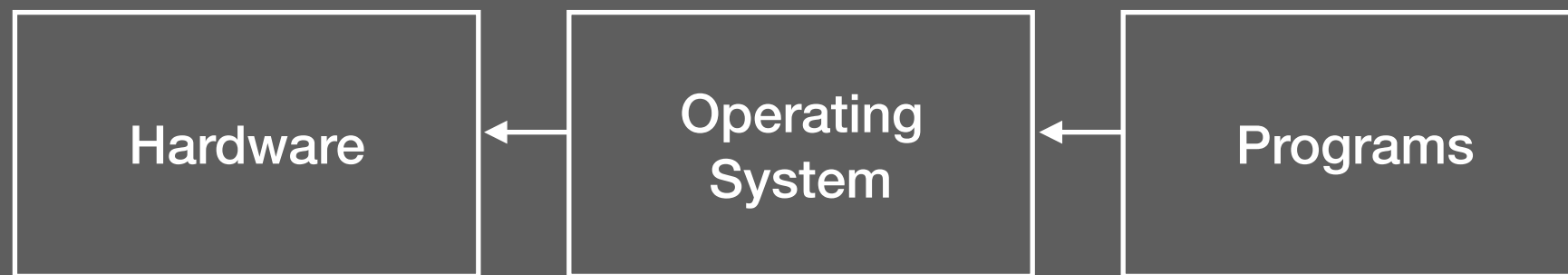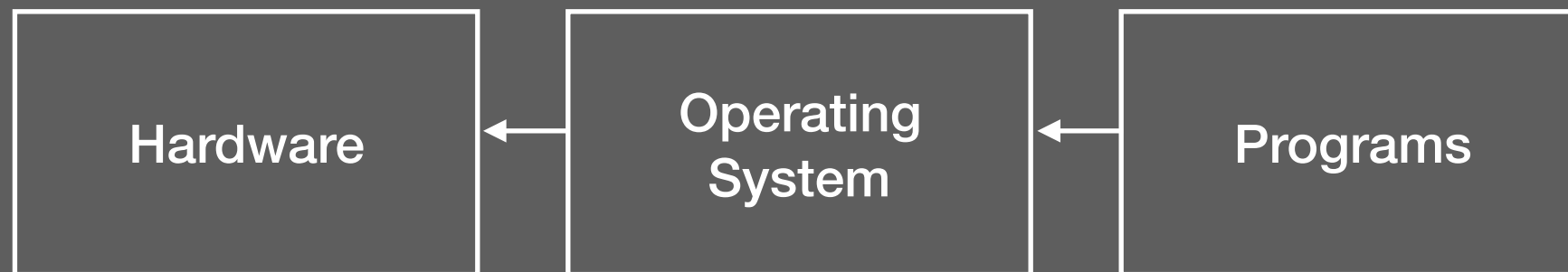
Operating systems abstract away the hardware for programs.

The **way** they abstract is the key!

What is a shell


```
┌─────────────┐      ┌─────────────┐      ┌─────────────┐
│             │  ←── │  Operating  │  ←── │             │
│  Hardware   │      │   System    │      │  Programs   │
│             │      │             │      │             │
└─────────────┘      └─────────────┘      └─────────────┘
```

Shell is the program which the user uses to communicate to the operating system.

What is a shell

Hardware	←	Operating System	←	Shell	←	Programs

User → Shell
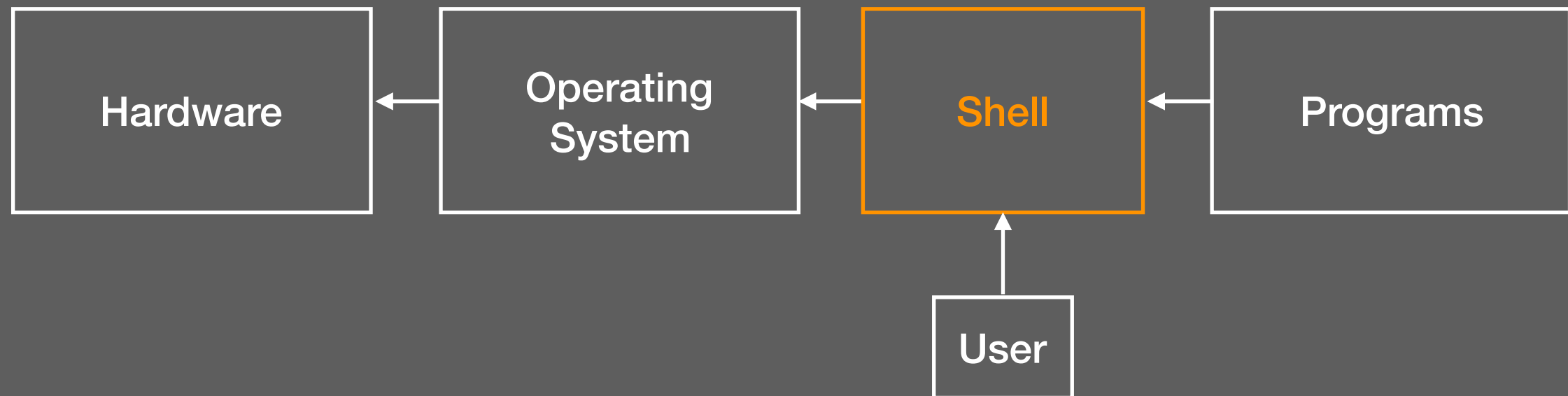
Shell is the program which the user uses to communicate to the operating system.

How do they Abstract?
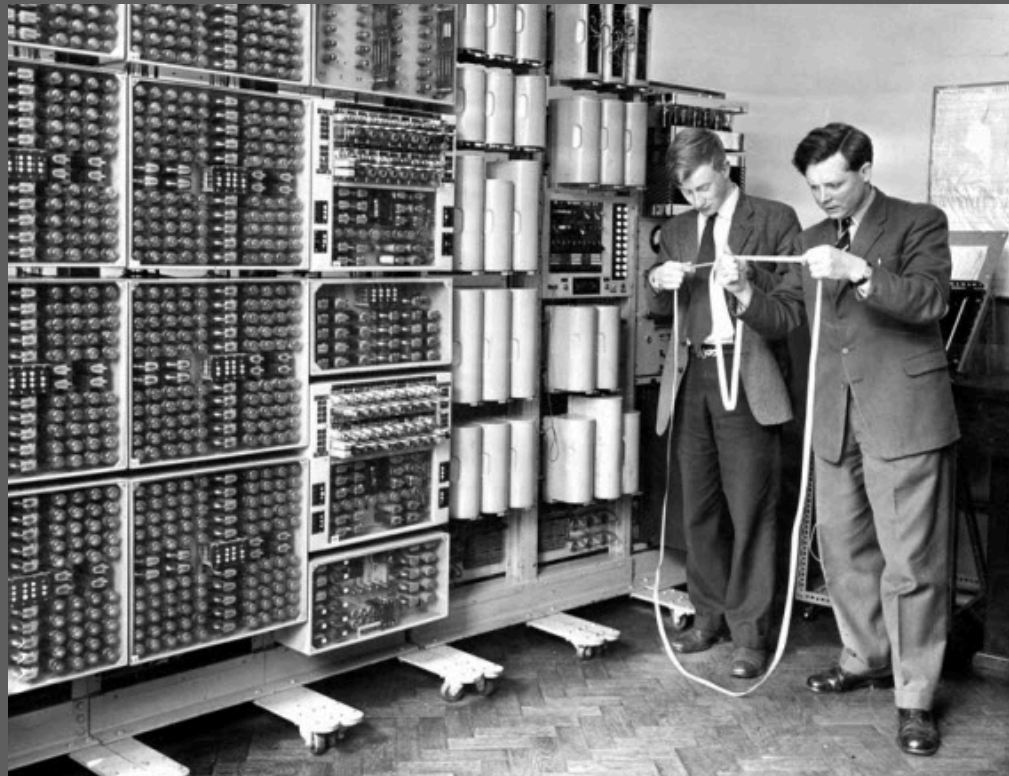
Central mainframe

↓

Command line
(unix)

Typical Workspace

↓

Graphical User Interface
(apple, windows)

GUI vs Command line

GUI vs Command line

Capturing complex instruction with language is much easier than with skeuomorphism.

GUI vs Command line

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Bandwidth is much smaller between user and shell.

GUI vs Command line
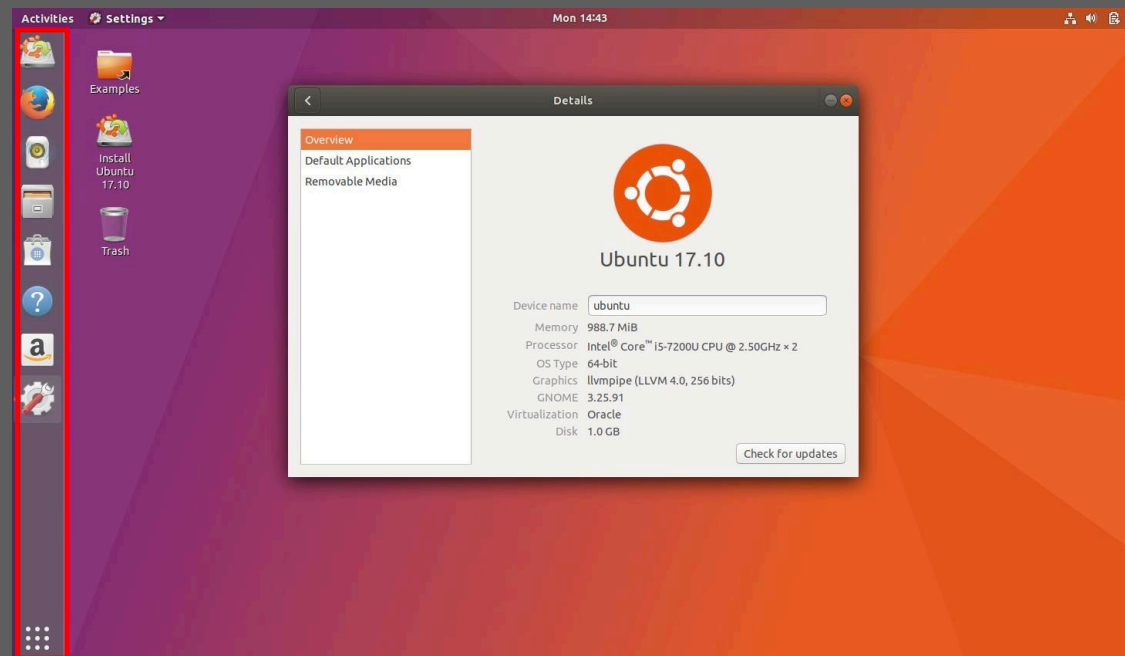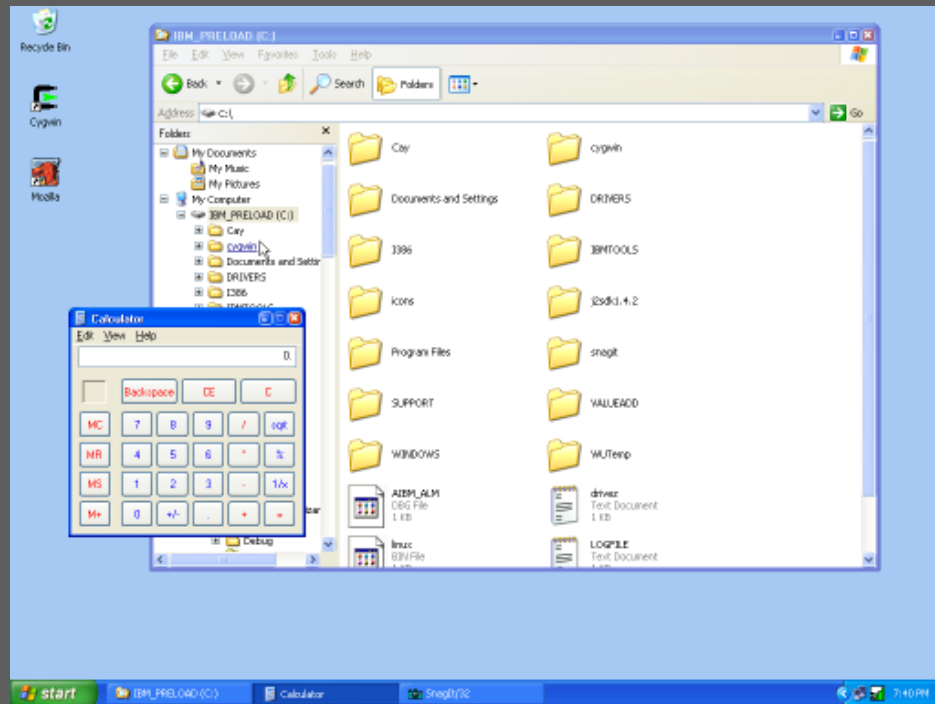
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Repeating stuff is easy.

GUI vs Command line

Capturing complex instruction with language is much easier than with skeuomorphism.

Bandwidth is much smaller between user and shell.

Repeating stuff is easy.

Much harder learning curve.

GUI Shells

History of Unix Shell

sh
(aka Bourne shell) The original
Shell written for the unix
operating systems

ksh
Developed by David Korn, this strives
to closely emulate Bourne shell and
be compatible with POSIX standards
pdksh, mksh etc.

fish, sash
Specialised shells developed while
prioritising specific needs

csh
Developed to be used with a
language that is similar to C.
tcsh, zsh etc.

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Developed by Brian Fox for the
GNU project, strives to be free
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Though there is a lot of history and evolution all of them remained backward compatible and POSIX compliant

bash is synonymous with a command line shell for unix and unix-like (linux) systems.

Major functions of Shell

Managing Input and Output

Managing Filesystem

Executing Programs

Basic concepts

How to talk to the shell

file system, reading and writing from file system

Installing and Executing Programs

Passing data through programs

Doing things multiple times

Automating things

Demo!

Remote access

ssh - **s**ecure **sh**ell

Purpose	Geography servers
Gateway Servers	archibald.geog.ucl.ac.uk roundabout.geog.ucl.ac.uk squarepeg.geog.ucl.ac.uk triangleting.geog.ucl.ac.uk
General Purpose	ankara.geog.ucl.ac.uk bangkok.geog.ucl.ac.uk caracas.geog.ucl.ac.uk dakar.geog.ucl.ac.uk edinburgh.geog.ucl.ac.uk freetown.geog.ucl.ac.uk gaborone.geog.ucl.ac.uk hanoi.geog.ucl.ac.uk islamabad.geog.ucl.ac.uk khartoum.geog.ucl.ac.uk lima.geog.ucl.ac.uk muscat.geog.ucl.ac.uk nassau.geog.ucl.ac.uk ottawa.geog.ucl.ac.uk pyongyang.geog.ucl.ac.uk quito.geog.ucl.ac.uk rabat.geog.ucl.ac.uk seoul.geog.ucl.ac.uk tirana.geog.ucl.ac.uk ulanbator.geog.ucl.ac.uk valletta.geog.ucl.ac.uk washington.geog.ucl.ac.uk

Purpose	CDRC servers
Database	cdrc-db.geog.ucl.ac.uk
High Memory (1TB of RAM)	cdrc-highmem.geog.ucl.ac.uk cdrc-footfall.geog.ucl.ac.uk
Storage	cdrc-archive.geog.ucl.ac.uk
Computing	cdrc-node01.geog.ucl.ac.uk cdrc-node02.geog.ucl.ac.uk cdrc-node03.geog.ucl.ac.uk cdrc-node04.geog.ucl.ac.uk cdrc-node05.geog.ucl.ac.uk cdrc-node06.geog.ucl.ac.uk cdrc-node07.geog.ucl.ac.uk cdrc-node08.geog.ucl.ac.uk

Purpose	UCL Server
General HPC	Legion
Parallel Proc.	Grace
Storage	Myriad

https://www.geog.ucl.ac.uk/resources/computer-support/linux-remote-access

https://www.ucl.ac.uk/research-it-services/services/research-computing-platforms

Questions