Introduction

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What is an operating system?

Abstraction, virtualisation and managing of resource.

- Abstraction
  - How do we create an abstraction layer that provides an environment for programming of a process?
- Virtualisation
  - How do we create the image of dedicated hardware while in fact we have several process sharing the same hardware?
- Resource management
  - Given that we have limited amount of resources, how do we share them in a fair way?

Abstraction

Applications

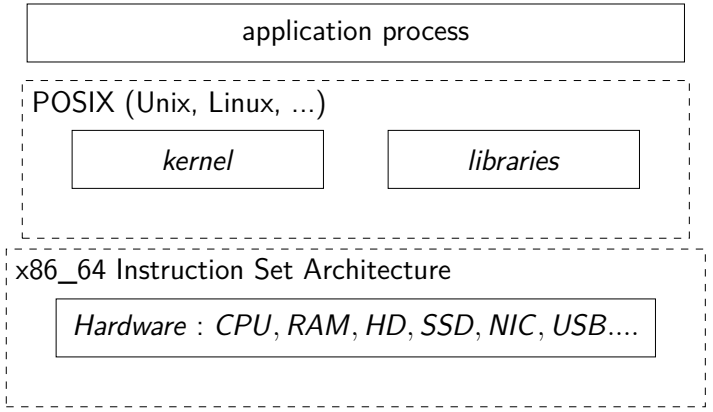
a clean interface

The Operating System

a complete mess

Hardware

Abstraction



POSIX: Portale Operating System Interface

Operating system API

- process handling: fork, exec, wait, ...
- process communication: pipes, ..
- threads handling: pthread_create, ...
- managing directory and file ownership
- network handling: socket, listen, accept, ...
- ...

The C Standard Library (ISO C18)

- memory allocation: malloc, free, ...
- signal handling: signal, raise, kill, ..
- file operations: fopen, fclose, fread, fwrite, ...
- ...

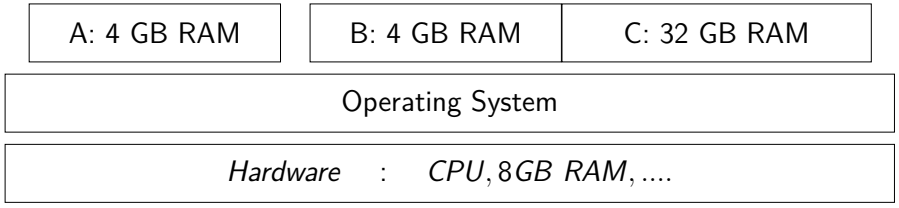
Command Line Interpreter

- shell: the text based interface
- scripting languages
- ...

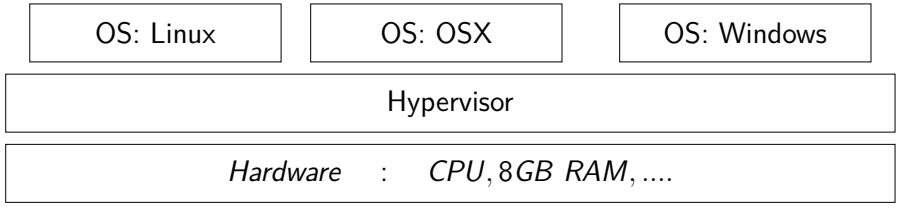
C programs

```
int counter = 0;

void hello(char *name){
  printf("Hello: %s, %d\n",  name, counter);
}

int main() {
  char *me = argv[1];
  while(counter != 10) {
     counter++;
     hello(me);
     sleep(1);
   }
   return 0;
 }
```


Virtualization



Virtualization



Resource management

- Time: scheduling, how do we divide the execution time among processes
- Memory: efficient allocation and deallocation, malloc/free...

to implement an operating system

Why is it hard to implement an operating system?

Summary

Start programming today.