

Introduction

Johan Montelius

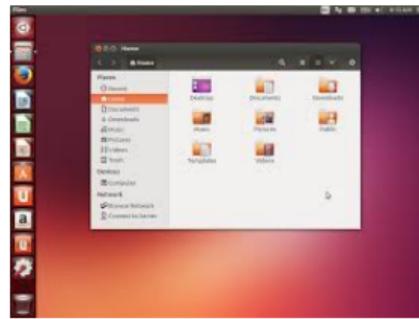
KTH

2016

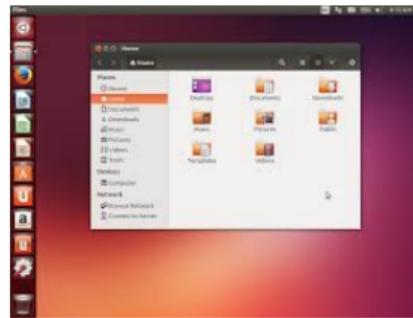
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Choosing an operating system

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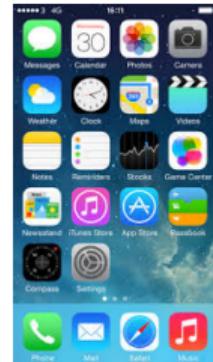
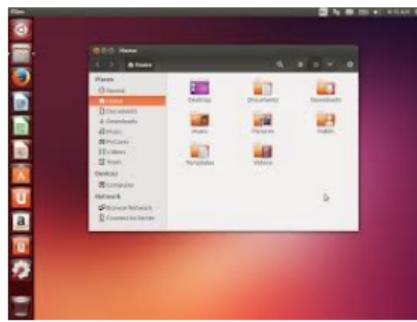
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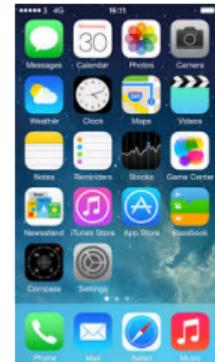
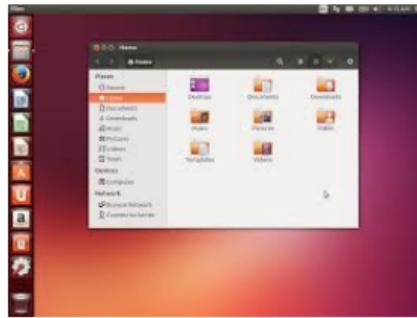
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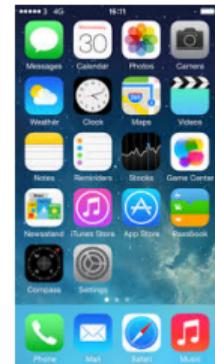
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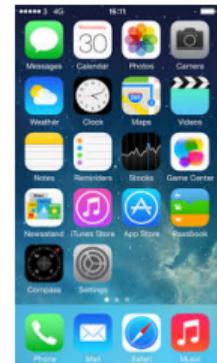
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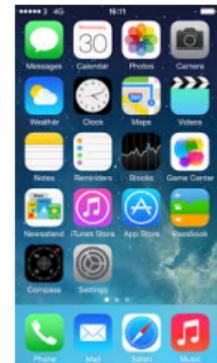
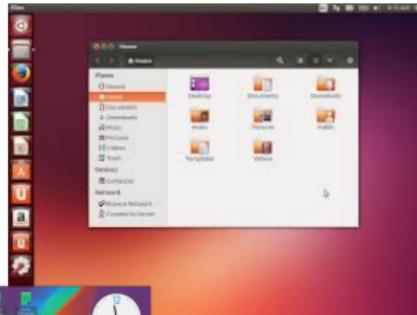
Choosing an operating system



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Choosing an operating system

What is important when choosing an operating system?

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- What everyone else is using.

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What is important when choosing an operating system?

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- Look and feel, ease of use.
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- Cost
- Availability of programs
- :
- :
- How it works under the hood.

What is an operating system?

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Abstraction, virtualisation and managing of resource.

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 - How do we create the image of dedicated hardware while in fact we have several process sharing the same hardware?

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- 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?

The Operating System

A well structured world

The Operating System

A well structured world

a clean interface

The Operating System

A well structured world

a clean interface

The Operating System

Hardware

A well structured world

a clean interface

The Operating System

a complete mess

Hardware

to implement an operating system

to implement an operating system

Why is it hard to implement an operating system?

layers of abstractions

OS A

layers of abstractions

Nice world

OS A

layers of abstractions

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Hardware X

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OS A

OS A

a complete mess

another mess

Hardware X

Hardware Y

Hardware Z

layers of abstractions

Nice world

Same world

a clean interface

same interface

OS A

OS A

a complete mess

another mess

another mess

Hardware X

Hardware Y

Hardware Z

layers of abstractions

Nice world

Same world

a clean interface

OS A

same interface

Windows

a complete mess

OS A

another mess

Hardware X

Hardware Y

Hardware Z

layers of abstractions

Nice world

Same world

a clean interface

strange interface

OS A

OS A

Windows

a complete mess

another mess

another mess

Hardware X

Hardware Y

Hardware Z

layers of abstractions

Nice world

a clean interface

OS A

a complete mess

Hardware X

Same world

same interface

OS A

another mess

Hardware Y

Different world

strange interface

Windows

another mess

Hardware Z

yet another layer

nice B

OS B

yet another layer

nice B



standard C



yet another layer

clean A

OS A

nice B

OS B

standard C

OS C

yet another layer

Java API

Java

clean A

OS A

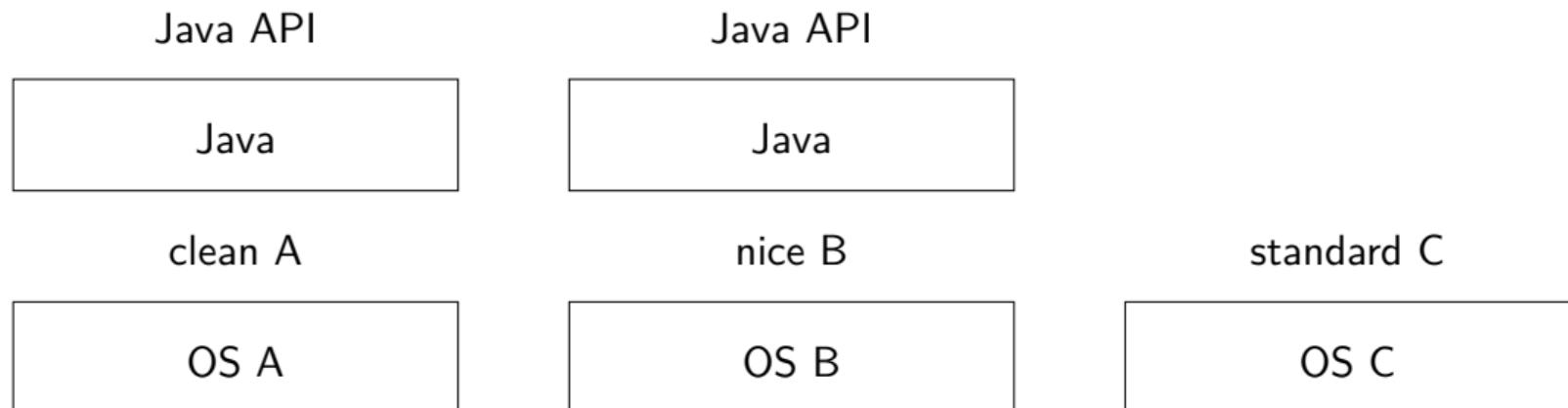
nice B

OS B

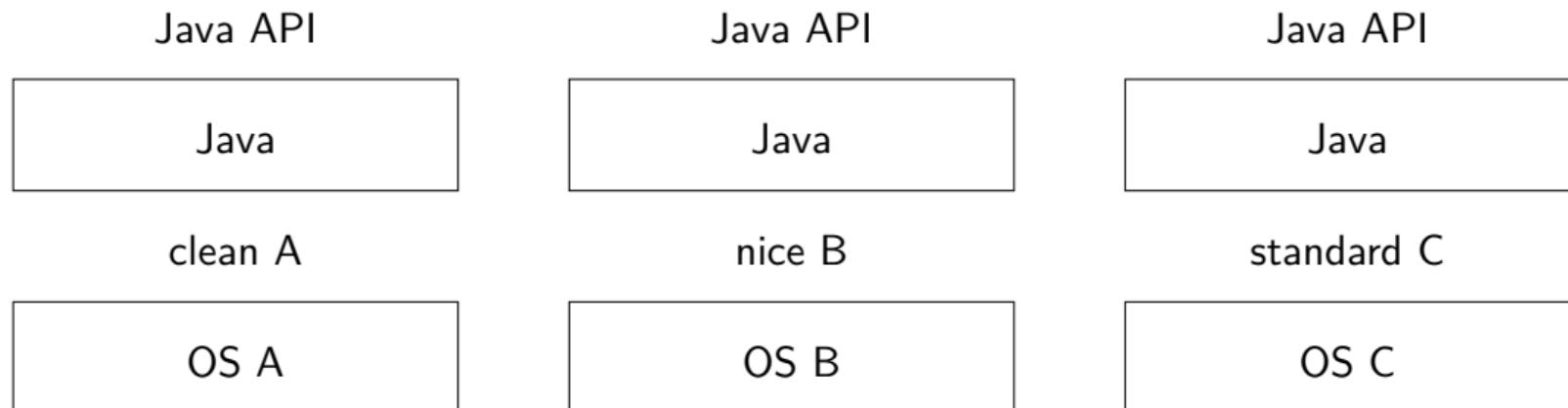
standard C

OS C

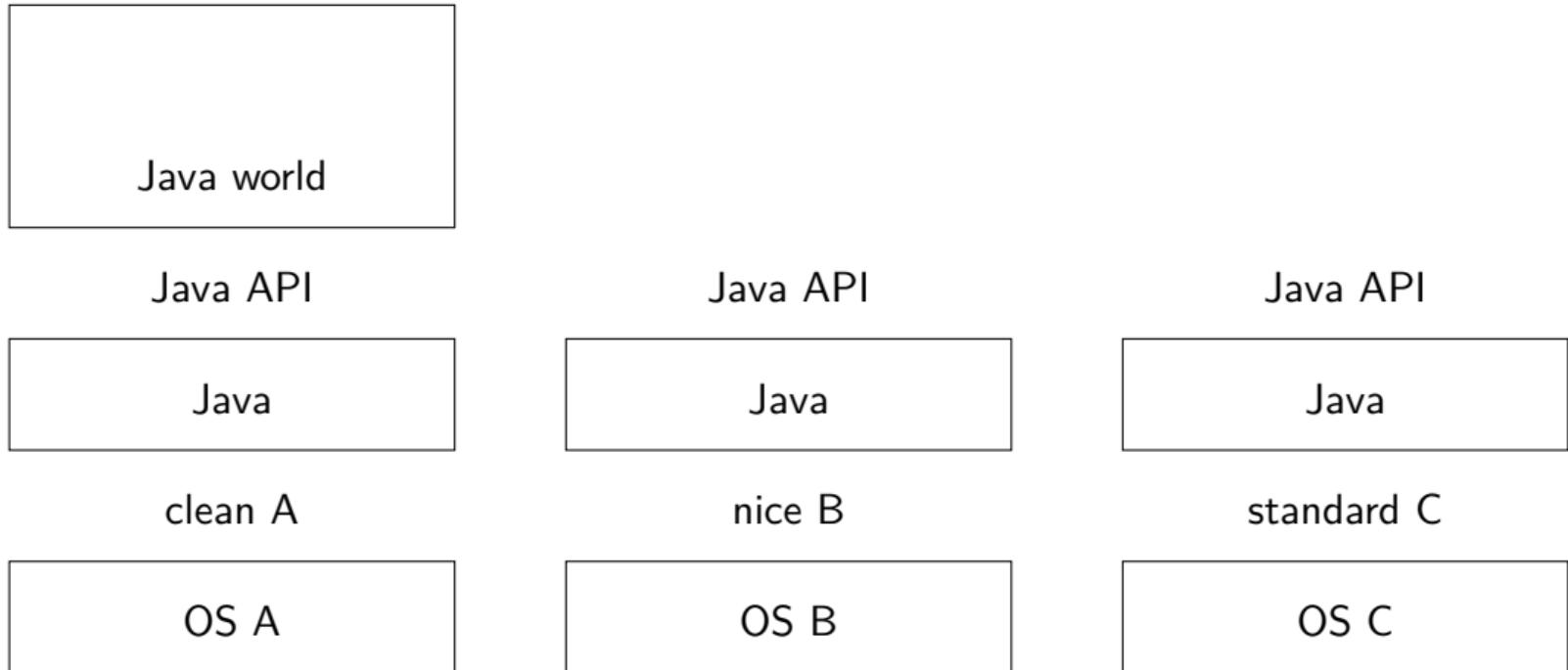
yet another layer



yet another layer



yet another layer



clean A

OS A

clean A



nice B



virtual operating systems

clean A

OS A

nice B

OS B

standard C

OS C

World A

clean A

OS A

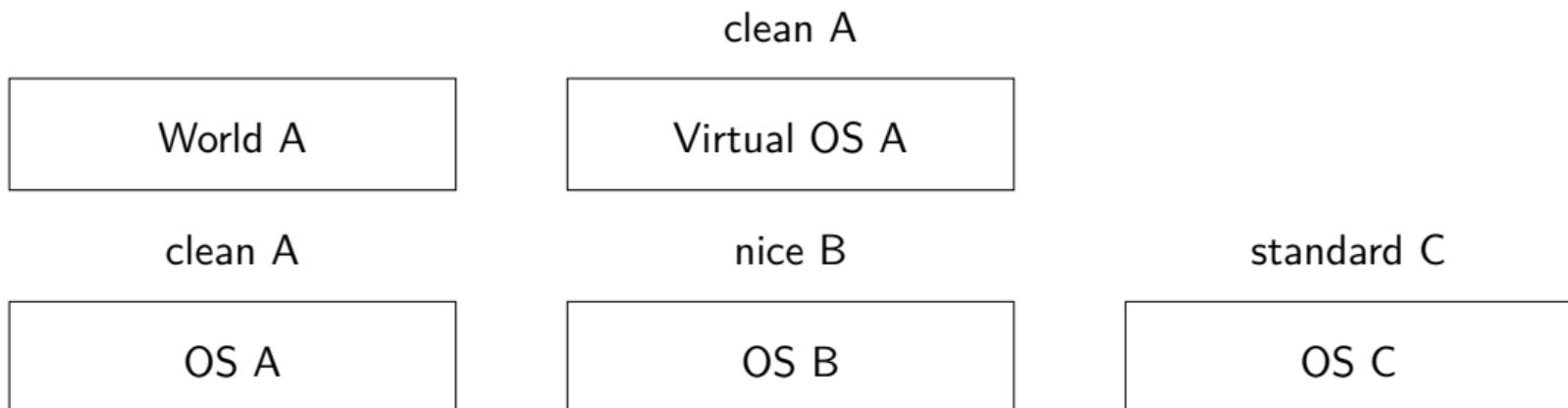
nice B

OS B

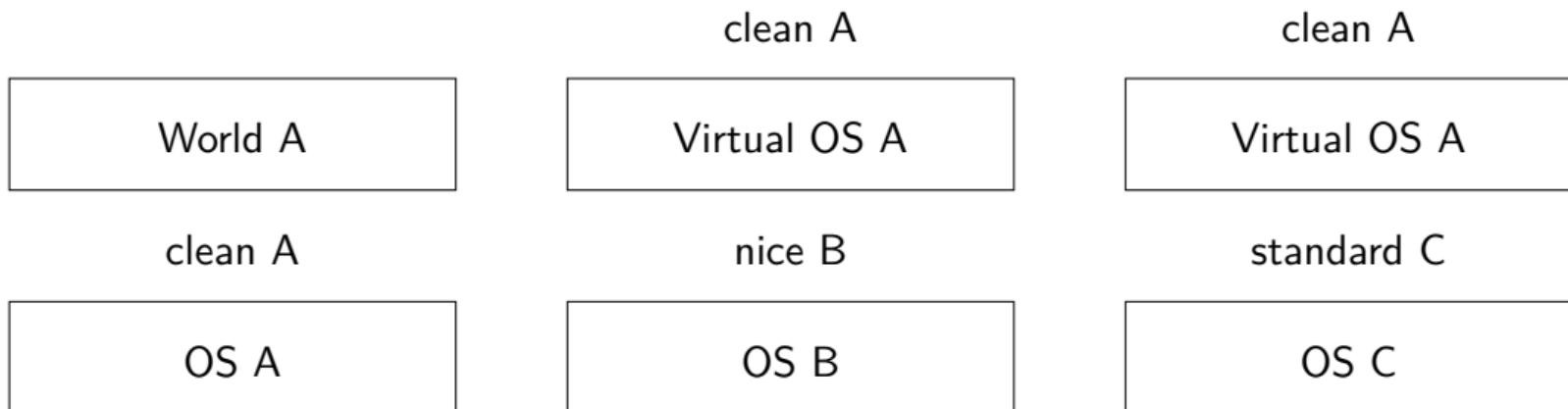
standard C

OS C

virtual operating systems



virtual operating systems



provide isolation and control

clean A

OS A

provide isolation and control

Virtual OS A

clean A

OS A

provide isolation and control

Virtual OS A

Virtual OS A

clean A

OS A

provide isolation and control

Virtual OS A

Virtual OS A

Virtual OS B

clean A

OS A

provide isolation and control

Virtual OS A

Virtual OS A

Virtual OS B

mean and lean

— Hypervisor —

Some history - way back



BESK - KTH 1953, 512 word memory

- - 1960
- Large single job machines, batch processing
- Operating system often only libraries to handle hardware.

also long time ago



PDP-10 - KTH 1970 ca, 256 Kiword memory

- 1970 - 1980
- Multiuser systems, minicomputers (very large)
- Time sharing, virtual memory, hard drives, ...
- Birth of Unix and C



Mac or IBM PC?

- 1980 - 1990
- The personal computer.
- Manual switching between programs.
- MS-DOS, Mac OS, ..

The *nix war



AIX, HP-UX, Solaris, Ultrix ...

- 1980 - 2000
- Unix flavors become the leading operating systems for everything but personal computers.
- Everyone wants a standard - their own.

at the same time



Gnu is Not Unix

- 1983 -
- Providing a free (as in speech, not beer) operating system with everything you could need.
- Everything was in place ... the kernel will soon be ready.

1991

Hello everybody out there using minix -

I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. ::

PS. Yes - it's free of any minix code, and it has a multi-threaded fs. It is NOT portable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-(.

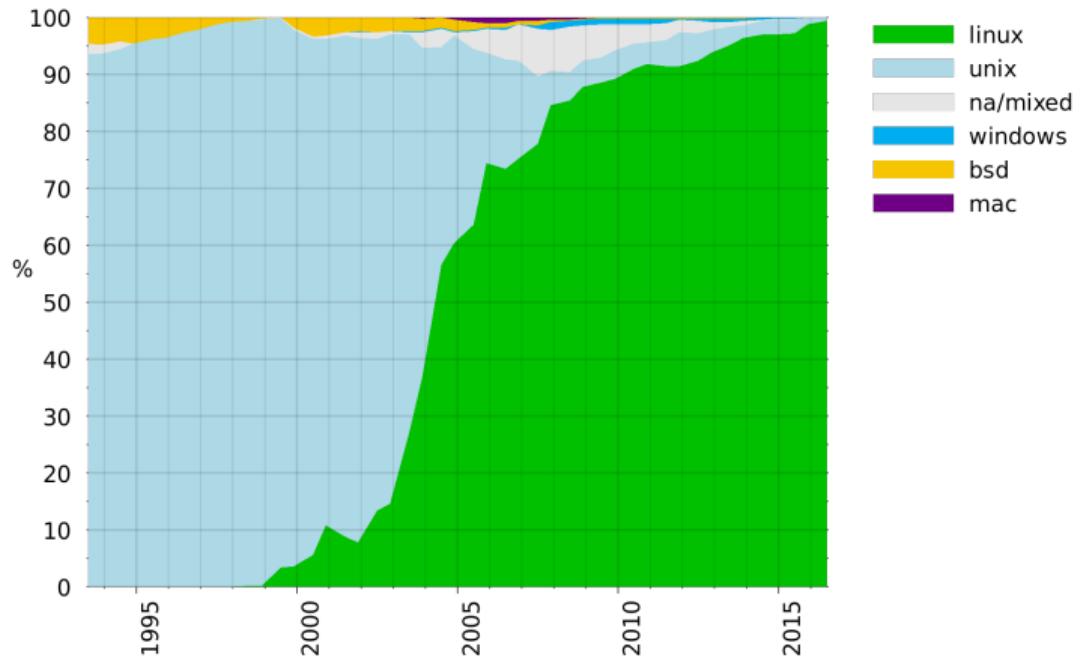
- Linus Torvalds



Linux - the kernel for GNU

- 1993 -
- Linus Torvalds
- An implementation influenced by MINIX for Intel 386 CPU.
- Linux was born and became the kernel for GNU.

2016



Three options:

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- Install a *virtual machine* on top of your regular system.

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- Take an old laptop and boot it from scratch.

Three options:

- Install a *virtual machine* on top of your regular system.
- Take an old laptop and boot it from scratch.
- Join the good side.

What's next

What's next

