Is this a *boring* subject only about the theory of the internal operation of an operating system???
Is this a theoretical subject?

- Hmm, operating systems: sounds like a theoretical subject
- At university, a lot of theory from a text book
- Are we going to spend lots of time copying from a text book? . . .

No! This is practical!
Mostly based on Linux
Nick Loves Linux
So why does Nick love Linux?
More reasons why Nick Loves Linux
Open Standards and Protocols
Standards that are not so open
Embrace and Extend
Other “Industry Standards”
What is “Systems Integration”?
Why From Many Companies?
Monoculture (One supplier)
How Best to Integrate?
Standards
So what answers are there?
Samba — Systems Integration
Practical: 60 hours of laboratory workshops!
This subject aims to provide you with practical skills that you will find useful in your workplace.

You learn here by doing.

I even understand this subject too!
Mostly based on Linux

- ...with some comparisons with Windows 2000.
- Aim to support career certification, e.g., Red Hat Certified Engineer, Linux Professional Institute

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So why does Nick love Linux?

- It is free software
- Free as in freedom
- ... also, free as in free beer
- It works really well
- It can “glue” many other things together
- Like Lego; can build anything I want
More reasons why Nick Loves Linux

- Built on cooperation
- Great for Internet applications
- Only fully compliant TCP/IP
- We can see and modify the source code to any of it that we want to
- Based on standards
- Uses open protocols
Open Standards and Protocols

What do I mean by “Open Standard?”
- Can freely download the standard, not pay a huge fee just to read it
- Agreed to by open discussion: barrier to participation is lack of ability, not lack of money!
- Examples of open standards:
  - TCP/IP, http, SSH, ftp, DNS, DHCP, Perl, LDAP, SMTP, TLS, many, many more
Standards that are not so open

- Many standards are developed in a less open way
- Example: the WEP protocol, used to provide “privacy” for wireless LANs
- Developed behind closed doors, announced to the public
- Cracked almost immediately: a bad design
- Not open to inspection and peer review
Many companies use “standards”
- But change them a little bit to give a competitive advantage
- Example: Kerberos
  - Developed at MIT as open source software,
  - Improved by programmers all round the world
  - Used by Microsoft for authentication in Active Directory
- Microsoft changed the interpretation of one small part of the protocol
- Effect: all Kerberos clients can use a Microsoft Kerberos server
- But Microsoft clients will refuse to work with anything except a Microsoft server.

Embrace and Extend

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Other “Industry Standards”

- Consider the Microsoft Office suite
- The layout is a secret
- OpenOffice.org has developed an office suite that can read and write Office documents
- Very hard work:
  - a moving target
  - Much effort by MS to make them very hard to read, and even harder to write
What is “Systems Integration”?

- It involves combining products from many companies into a system
- Other words: *interoperation, compatibility*
- Very important: it's not enough just to learn one product
Why From Many Companies?

- Why not just from one supplier?

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Monoculture (One supplier)

- Advantages:
  - Fewer system integration problems
  - Less skill required
  - All training from the one vendor
- Disadvantages:
  - Vulnerability in one is a vulnerability in all (e.g., So.Big, Blaster, SirCam, NIMBDA worms, Outlook viruses)
  - One supplier cannot make everything:
  - E.g., Cisco sell more routers and switches than Microsoft

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How Best to Integrate? Standards

- Using *Open Standards* that are free of patents and other restrictions on use
- ...But every vendor says they support the standards!
- Some standards are more open than others!
Free software supports open standards
So open, you can read the source code and see how it works!
You can even change it to suit your needs, and if you find problems, you can fix them!
Aim for interoperation, not for exclusion or market benefit
Samba — Systems Integration

- Samba allows a Linux or Unix or Macintosh machine to talk with Windows
- and the other way round
- Free Software
- A Linux machine can be an NT-4 compatible Primary Domain Controller
- Can also be an AD member
- Very stable, high quality
- Used by many companies to interoperate with Windows
We start this week!

So what will we do?

In the first class, we partition hard disks

. . . then install Linux.

See you there!