

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

## Operating Systems and Systems Integration

Is this a theoretical subject?

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!

# 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? ...

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# NO! This is *practical!*

- 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!

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

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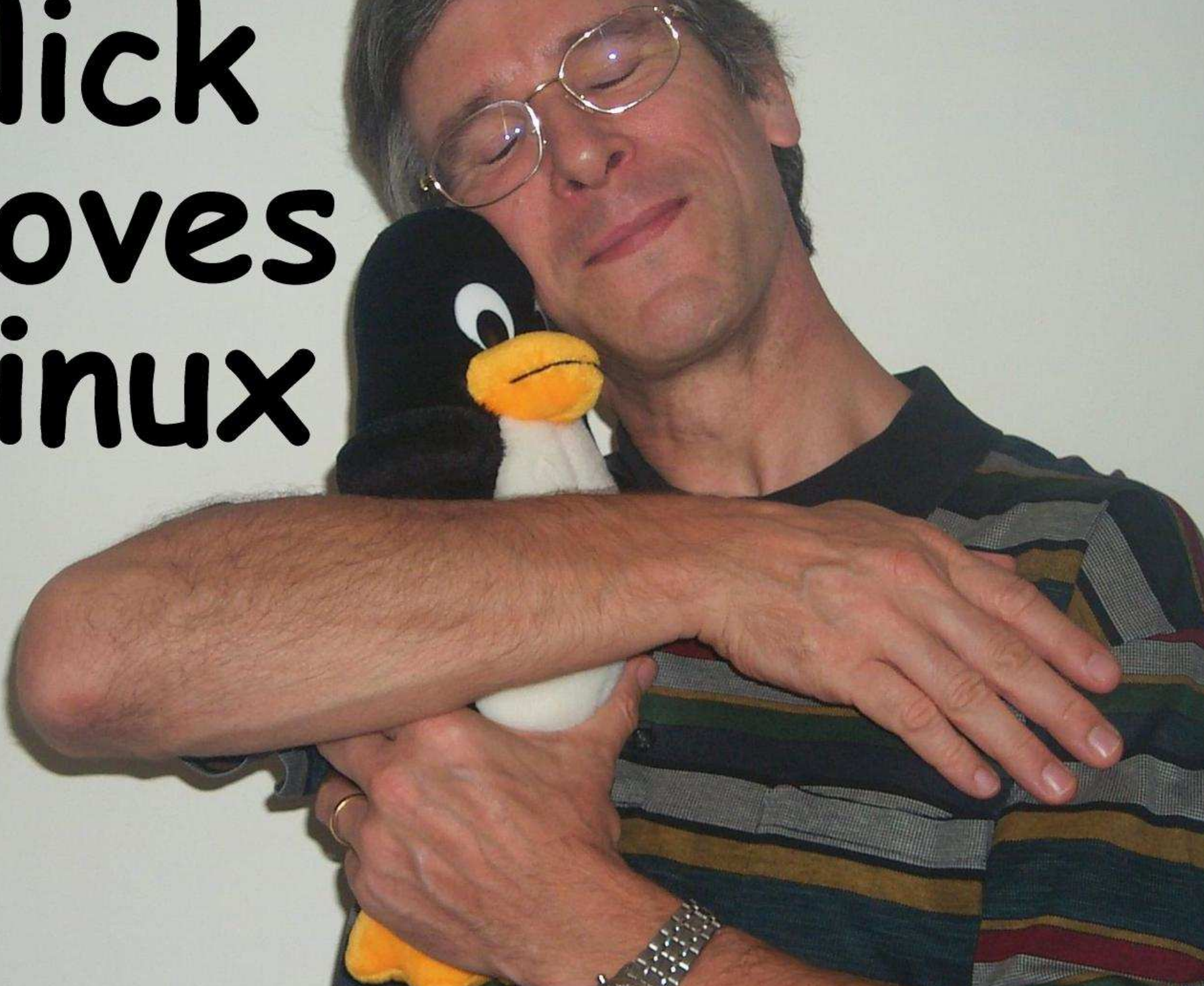
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# Nick Loves Linux



# 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

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# 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

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# 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

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# 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

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# Embrace and Extend

- 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.

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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

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# 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

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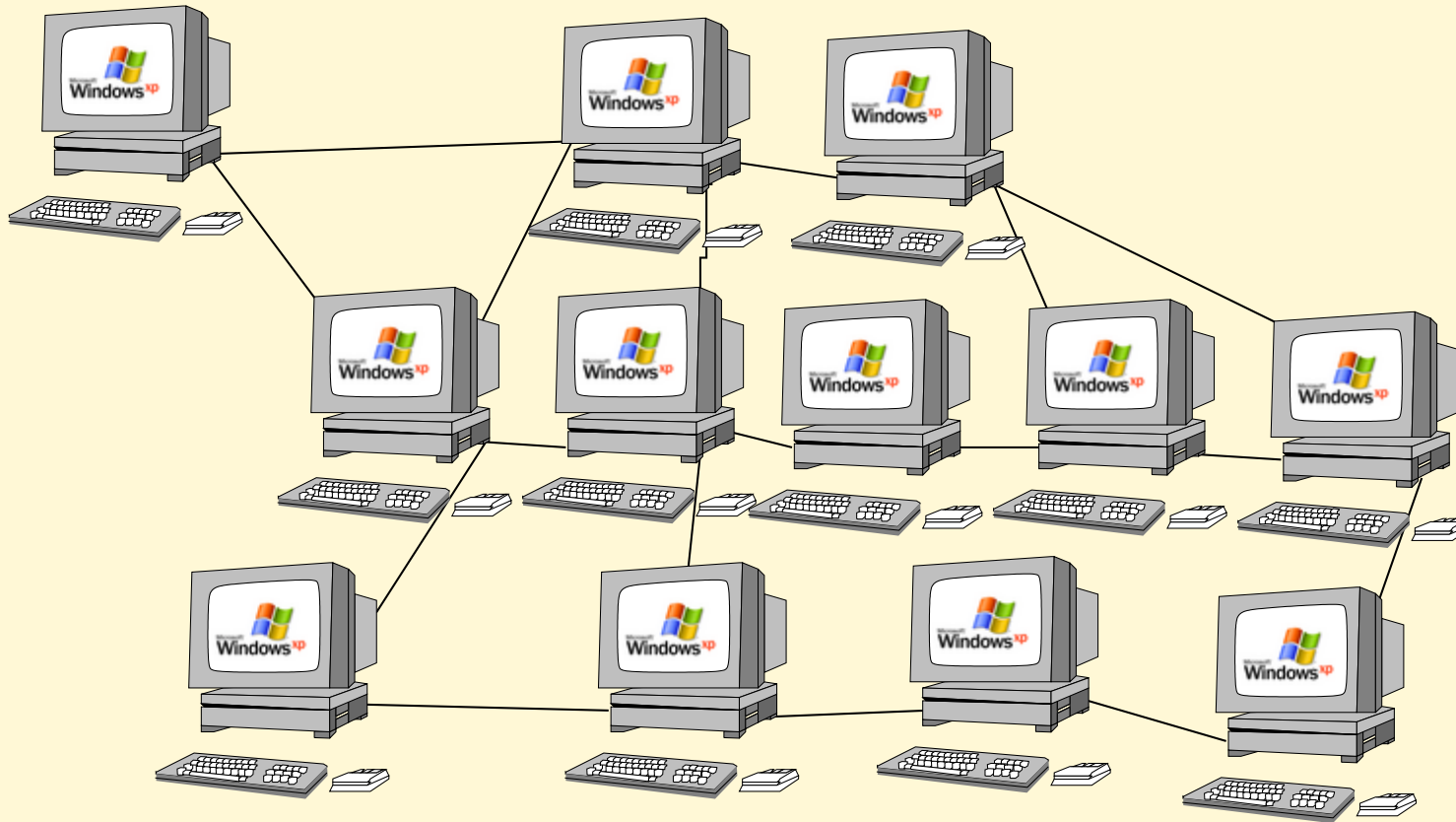
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# Why From Many Companies?

## ■ 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!

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# So what answers are there?

- 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

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# 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

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# Practical: 60 hours of laboratory workshops!

- We start this week!
- So what will we do?
- In the first class, we partition hard disks
- . . . then install Linux.
- See you there!

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