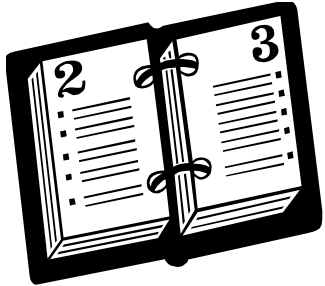




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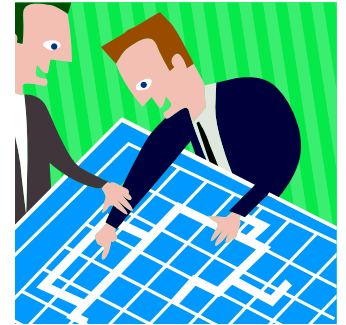
INFO5990 Professional Practice in IT

Lecture 09A

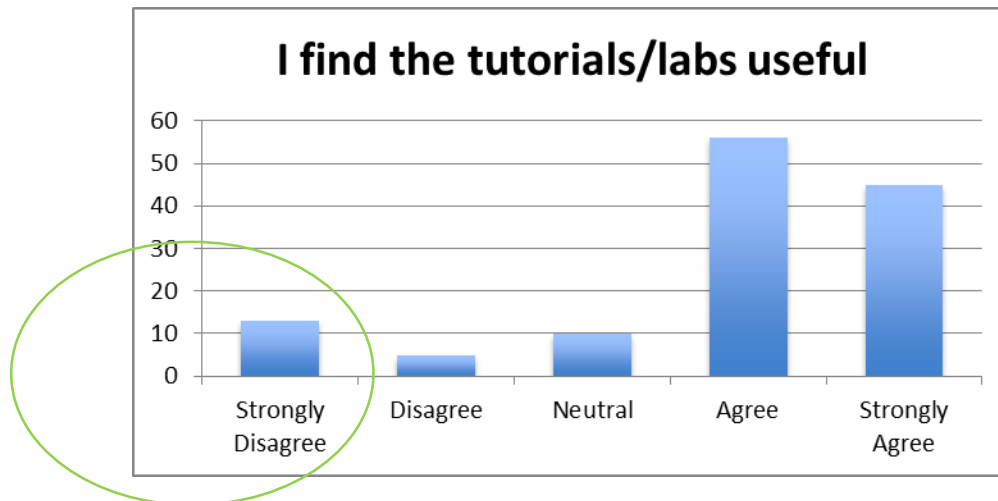
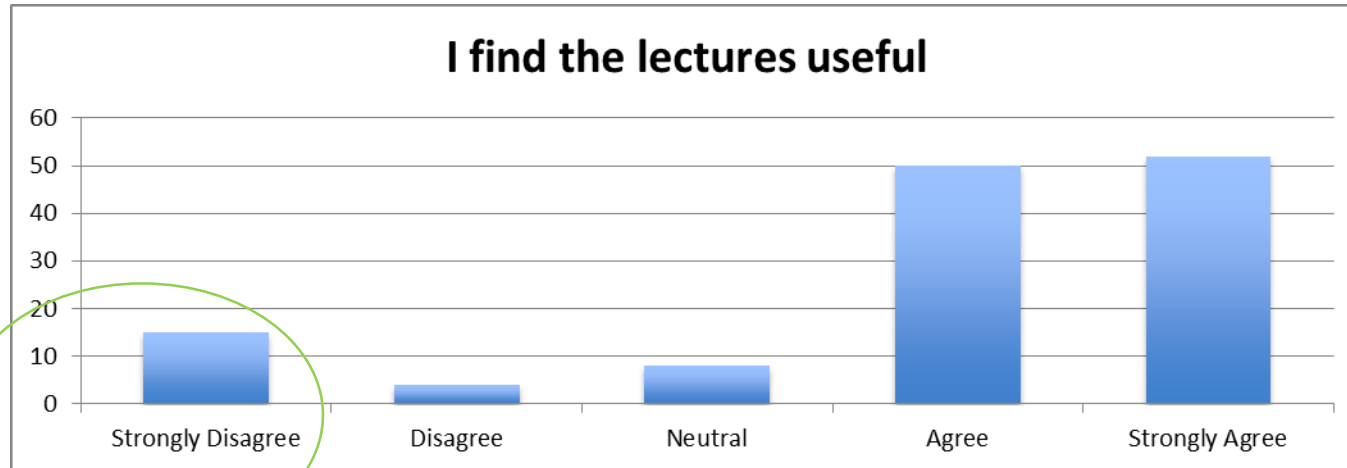


Case studies

Performance testing



Mid-semester feedback



Comments

- Seats are too close to other people, also there is not enough legroom.
- I think the tutorials is useful. And it practice our communicate skills. Change the way I work in the group. The tutorial is perfect.
- Lecture room could be a bit more comfortable.
- it's useful , the reading material is connected with topic
- I think it is too busy to discuss two materials in the tutorial, and discussion time is a little short.
- For tutorial, I had to read a lot, and get a good preparation for it. On the tutorial every one have to say something, but it is hard for me.
- The lecturers are really great and helpful. I expected this subject to be a dry, boring course at start but has made it really exciting and interesting for me. The way Khimji explains the unit content by relating to real world application makes understanding easier. I'm content the way classes and tutorials are going on for this Subject. A big thanks to Dr. Khimji! (totally dissatisfied !)

Assignment 2

- Next week is term break
- One more lecture/tutorial before submission
- Reports to be submitted online on the Sunday (changed from the Course Outline as requested by class)
 - **Between 3rd-10th of Oct 2015 at 11pm**
- **Format – Team name_Assign2.doc**



- Presentations to be submitted online on the
 - **Between 2nd -10th Oct at 11pm** (changed from the Course Outline as requested by class)
- **Format: Team name_Assign2.ppt**
- One person in group to submit both !



Groups

- Make sure you are in the group
- Otherwise you get only 50% when your group may receive HD !



By the end of this lecture you will be able to:

- Appreciate the importance of system testing
- Understand the sort of difficulties encountered in testing large software systems
- Describe the testing arrangements employed in commissioning large software systems
- Case Studies

Group Debate

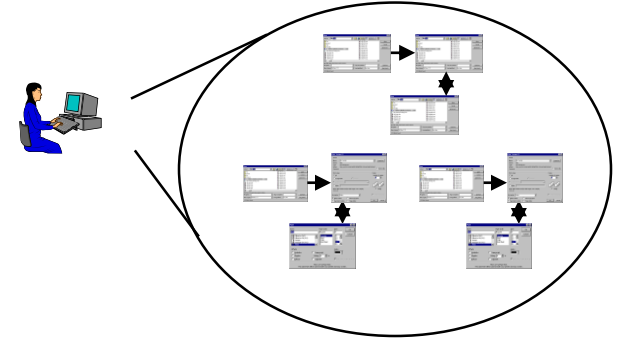
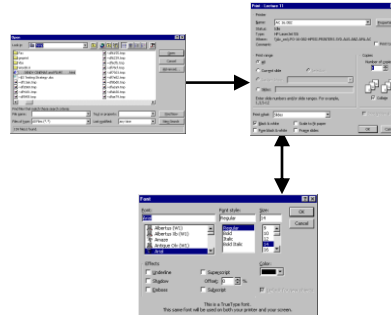
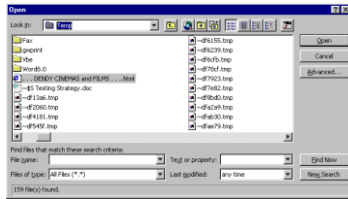


What jobs will be around in 20 years for you when you are all in your 50's ?
What role will IT play in these jobs ?

NSW Government: Jobs for the future report 2016

<http://www.bartondeakin.com/wp-content/uploads/2016/08/Barton-Deakin-Brief-NSW-Governments-Jobs-for-the-Future-Report1.pdf>

Testing during development



Component Test

- To ensure that each component behaves 'correctly'.
- Uses white-box testing to check each program function fully.

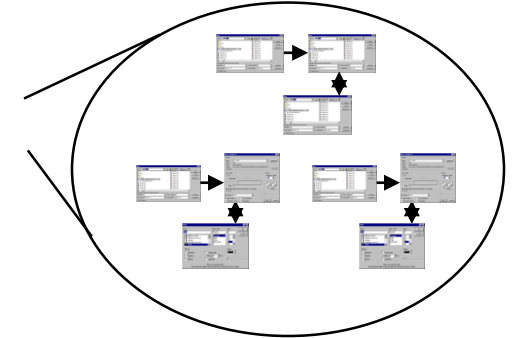
Integration Test

- To test interaction between related components.
- Focuses on interfaces between components.

System Test

- To ensure that the user requirements have been met.
- Focuses on usual business processes, and normal workflow.

Implementation Testing



Performance Test

- To test system performance under maximum expected load.
- Simulates key processes under maximum load.

Soak Test and Stress Test

- To ensure that system is stable over extended period.
- Load increased until system fails. Checks effects of over-load

Acceptance Test

- Compares system functionality against agreed-on user requirements
- Carried out by client using scenarios, supervised by developer

A Bitter experience

‘Nectar’ card launch fiasco



Nectar Fiasco

Tuesday, 17 September 2002

<http://news.bbc.co.uk/1/hi/business/2268797.stm>

- Customer loyalty scheme, set up jointly by Sainsbury's, BP, Barclaycard and Debenhams: intended to rival 'Air Miles' loyalty scheme.
- Offered a reward of 100 points bonus if you registered via internet.
500 points would get you a 'Big Mac'!
- As the deadline, 17 September, approached millions, hoping to sign up online, found they were locked out.
- They tried, again and again! UNTIL ...



The system collapsed!

- Approaching the deadline the website was getting 10,000 hits an hour!
- The sponsors were forced to pull tens of millions of pounds worth of advertising, hundreds of TV spots and press ads.
- *"The online operation was simply taken by surprise by the demand".*

Ian Barber, Barclaycard

"All I can think of here is that marketing has not been properly communicating with IT. To send this volume of letters out driving people to the website and not have the capacity in place is a serious flaw".

Andrew Didcott, Internet expert)




What do you think went wrong?

- The **functionality** of the system had been tested, but not under load
- Performance testing had not anticipated the **level of user load**
- Nobody knew that the system would **fail completely** under pressure
- Was the system testing adequate?

Question 1

The collapse of the 'Nectar' loyalty system was in most part caused by

- A. Greed of users wanting something for nothing
- B. Over reliance on third party software
-  C. Underestimation of the expected number of users
- D. Inadequate testing of system functionality
- E. Lack of communication between staff and management

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Score / 6
A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	

Another testing story

- A global grocery and general merchandising retailer
 - Grocery market leader in the UK
 - 702 stores
 - 30% market share
 - Stores in 14 countries
- In 2002 new online shopping system was to be rolled out
- Management demanded 'no glitches'



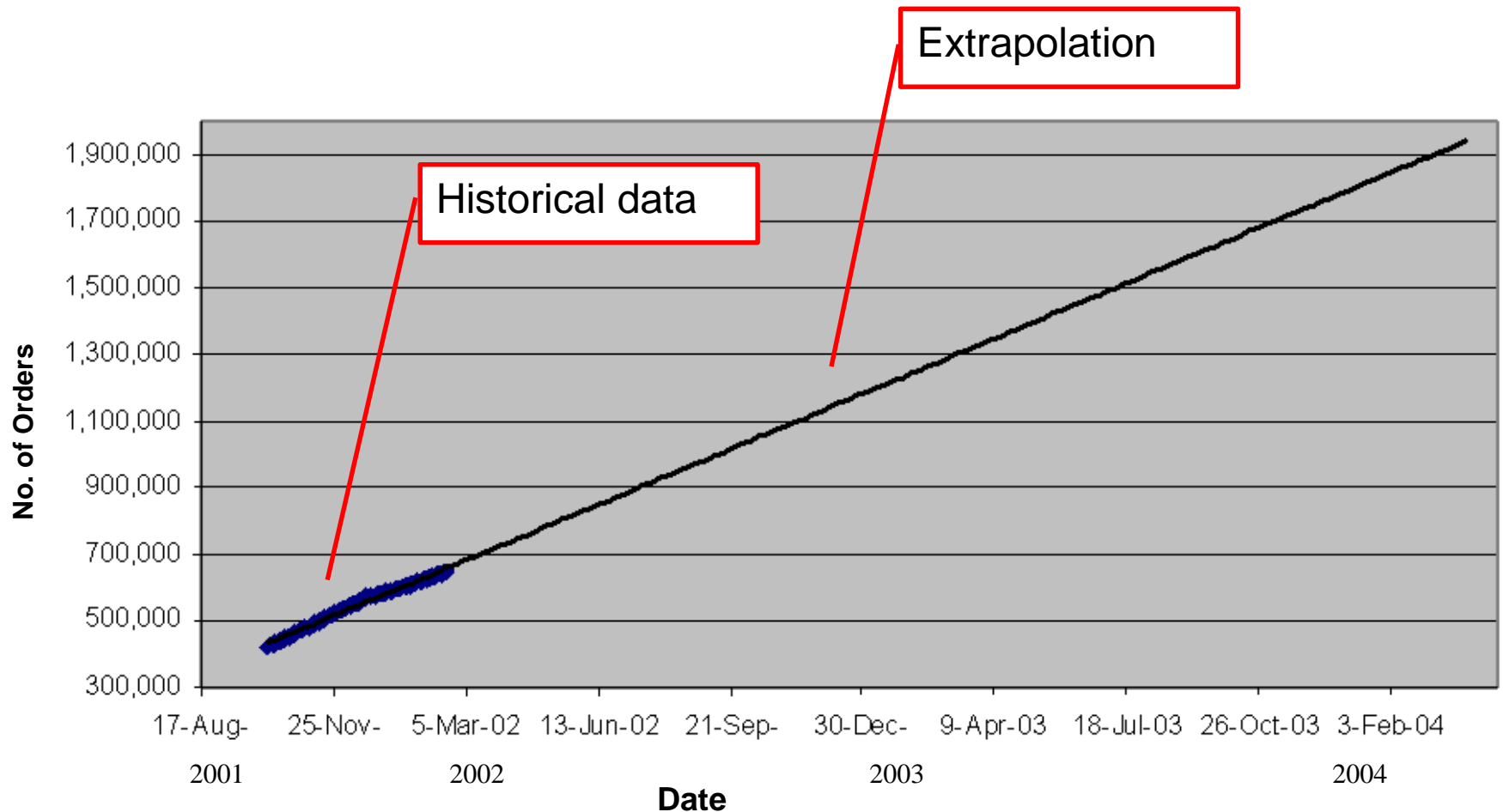
The test plan

- Total budget for testing, £1 million
- Testing to be carried out off line (so as not to interfere with live system)
 - Capacity model: to simulate user load two years into future
 - Usage model: typical mix of tasks
 - Test database: full-sized database, since size affects performance
 - To include soak and stress testing

Test data and test scenarios

Estimating target load

Extrapolating historical data: Oct 2001 – Apr 2002



Determining target load

- Historical data Oct 2001 – Apr 2002
- Trend extrapolated to Feb 2004 gave target 48,655 orders per week
- Corporate plan specified 341,642 orders for final 4 weeks of year = 85,410 pwk
- +25% for Christmas rush
- +10% for contingency
- *Target load* = 117,439 orders per week

Question 2

In the Tesco system test plan the usage model made use of


- A. Historical data from previous years
- B. Input from management's corporate plan
- C. Statistical extrapolation
- D. Allowances for Christmas and other contingencies
- E. ALL of the above



Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Score / 6
A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	

Question 3

In relation to performance testing what is the function of the 'capacity model'?

- A. To simulate the maximum expected load in terms of number of users
- B. To simulate the maximum expected load in terms of resulting system load
- C. To determine exactly how many customers there will be
- D. To model the relationship between performance and capacity
-  E. BOTH (A) and (B)

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Score / 6
A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	

Question 4

In relation to performance testing what the function of the 'usage model'?

- A. To simulate the likely mix of database activities
- B. To simulate the likely mix of user inputs
- C. To simulate the likely mix of communications
- D. To characterize the population of intended uses of the software in the intended environment
- E. ALL of the above



Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Score / 6
A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	

Hardware configuration

Test infrastructure (test rig)

- Large services centre hired for 1 month
- Hardware leased and set up in services centre
- Resemble actual system as closely as possible

Web servers	5 x Sun Enterprise 220R
Application servers ¹	11 x Sun Enterprise 420R
Database server	1 x Sun Enterprise 4500 ²
Load balancer	Alteon 3408 App. Switch
Firewall	Cisco PIX firewall
Routers	5 x Sun Enterprise Routers

¹ Initially each application server will run 2 java virtual machines, each bound to a separate IP address. This will later be optimised based on performance.

² The disk is a mirrored RAID A5200 disk array

Load test

- Modelling the expected usage of a software program by simulating multiple users accessing the program concurrently.
- Important for multi-user systems, often using client/server model, such as web servers.
- Other examples
 - a word processor or graphics editor could be tested on an extremely large document;
 - a financial package could required to generate a report based on many years' data.
 - A spreadsheet could be tested with maximum columns and rows

Soak Testing

- Testing with a significant load extended over a significant period of time, to discover how the system behaves under sustained use
 - A system may behave as expected when tested for 1 hour, but fail when it is tested for 3 hours.
 - Can expose problems such as memory leaks or stack overflows.
 - Also rounding, accumulation, or compounding errors, which can cause the system to fail or behave unexpectedly after some time.

Stress Testing



Subjecting a system to unreasonable load, while denying it the resources needed to process that load, (RAM, disc, mips, interrupts, etc).

- Stressing the system to breaking point to determine whether the breakdown is potentially harmful.
- Emphasis is on robustness, availability, and error handling, especially when under a load that is heavier than normally expected.
- Will it perform 'acceptably' in all situations?
- Particularly important for "mission critical" software, such as medical, space, defence applications
- It is desirable for the system to 'degrade gracefully'.


Postscript



- The Tesco online shopping system has performed without a hitch since it went live in May 2002
- In terms of revenue, Tesco is now third-largest retailer in the world, after Walmart and Carrefour.

Question 5

Which of the following is the most important goal of stress testing?

- A. to cause the system to collapse by applying unreasonable load
- B. to explore situations such as memory leaks when the system is under stress
- C. to check the user interface for problems when the users are stressed
-  D. to examine the behaviour of the system when it has insufficient resources
- E. to discover accumulation errors caused by system stress

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Score / 6
A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	

Question 6

Write down
your score

Which of the following sorts of problem is NOT likely to be exposed by soak testing?



- A. error handling
- B. memory leaks
- C. stack overflows
- D. accumulation errors
- E. compounding errors

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Score / 6
A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	A B C D E	