Introduction

COMP3231/9201/3891/9283

(Extended) Operating Systems

Kevin Elphinstone

Course Outline

- Prerequisites
  - COMPXXXX Data structures and algorithms
    - Stacks, queues, hash tables, lists, trees, heaps,….
  - COMPXXXX Microprocessor and Interfacing
    - Assembly programming
    - Mapping of high-level procedural language to assembly language
    - Interrupts
  - You are expected to be competent programmers!!!!
    - We will be using the C programming language
      - The dominant language for OS implementation.
      - Need to understand pointers, pointer arithmetic, explicit memory allocation.

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Why does this fail?

```
void func(int *x, int *y)

{

      *x = 1; *y = 2;

}

void main()

{

      int *a, *b;

      func(a,b);

      printf("%d %d\n",*a,*b);

}
```

Lectures

- Common for all courses (3231/3891/9201/9283)

- Tuesday, 3-5pm CLB6

- Friday, 3-4pm, CLB8

  - Extended OS Friday 4-5pm CLB8

    - starts in week 2

  - The lecture notes will be available on the course web site

    - Available prior to lectures, when possible.

    - Slide numbers for note taking

  - The lecture notes and textbook are NOT a substitute for attending lectures.

Tutorials

- Start in week 2
- A tutorial participation mark will contribute to your final assessment.
  - Participation means participation, NOT attendance.
  - Comp3891/9283 students excluded
  - Comp9201 optional
- You will only get participation marks in your enrolled tutorial.

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Assignments

- Assignments form a substantial component of your assessment.

- They are challenging!!!!
  - Because operating systems are challenging

- We will be using OS/161,
  - an educational operating system
  - developed by the Systems Group At Harvard
  - It contains roughly 20,000 lines of code and comments

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Assignments

- Don't under estimate the time needed to do the assignments.

- If you start a couple days before they are due, you will be late.

- To encourage you to start early,
  - Bonus 10% of awarded mark of the assignment for finishing a week early
  - To iron out any potential problems with the spec, 5% bonus for finishing within 48 hours of assignment release.
  - See course handout for exact details
    - Read the fine print!!!!

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Assignments

- Assignments are in pairs
    - Info on how to pair up available soon

- We usually offer advanced versions of the assignments
    - Available bonus marks are small compared to amount of effort required.
    - Student should do it for the challenge, not the marks.
    - Attempting the advanced component is not a valid excuse for failure to complete the normal component of the assignment
        - consider it a different optional assignmet

- Extended OS students (COMP3891/9283) are encouraged to attempt the advanced assignments

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Assignments

- Three assignments
  - due roughly week 5, 8, 12

- Also warm up bonus due in week 3
  - It's a warm up to have you familiarize yourself with the environment and easy marks.
  - Do not use it as a gauge for judging the difficulty of the following assignments.

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Assignments

- Late penalty
  - 4% of total assignment value per day
    - Assignment is worth 20%
    - You get 18, and are 2 days late
    - Final mark = 18 – (20*0.04*2) = 16 (16.4)

- Assignments are only accepted up to one week late. 8+ days = 0

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Assignments

- To help you with the assignments
  - We dedicate a tutorial per-assignment to discuss issues related to the assignment
  - Prepare for them!!!!!

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Plagiarism

- We take cheating seriously!!!

- We systematically check for plagiarised code
  - Penalties are generally sufficient to make it difficult to pass

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Cheating Statistics

Session	1998/S1	1999/S1	2000/S1	2001/S1	2001/S2	2002/S1	2002/S2	2003/S1	2003/S2
enrolment	178	410	320	300	107	298	156	333	133
suspected cheaters	10(6%)	26(6%)	22(7%)	26(9%)	20(19%)	15(5%)	???(?%)	13 (4%)	???(?%)
full penalties	2*	6*	9*	14*	10	9	5	2	1
reduced penalties cheaters	7	15	7	7	5	4	2	2	9
failed cheaters	4	10	16	16	10	12	5	4	?
suspended	0	0	**1**	0	0	**1**	0	0	0

*Note: Full penalty 0 FL not applied prior to 2001/S1

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Exams

- There is NO mid-session

- The final written exam is 2 hours

- Supplementary exams are oral.

  - Supplementaries are available according to UNSW & school policy, not as a second chance.

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Assessment

- Exam Mark Component
  - Max mark of 100
- Based solely on the final exam

- Class Mark Component
  - Max mark of 100
- 10% tutorial participation
- 90% Assignments

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3891/9283

- No tutorial participation component
- Assignment marks scaled to 100

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9201

- Optional tutorial participation, we'll award the better mark of

  – Tutorial participation included as for comp3231

  – Class marked based solely on the assignments

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Undergrad Assessment

- The final assessment is the harmonic mean of the exam and class component.

- If E >= 40,

$$M = \frac{2EC}{E+C}$$

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Postgrads (9201/9283)

- Maximum of a 50/50 weighted harmonic mean and a 20/80 harmonic mean

  – Can weight final mark heavily on exam if you can't commit the time to the assignments

  – You are rewarded for seriously attempting the assignments

- if E >= 40,
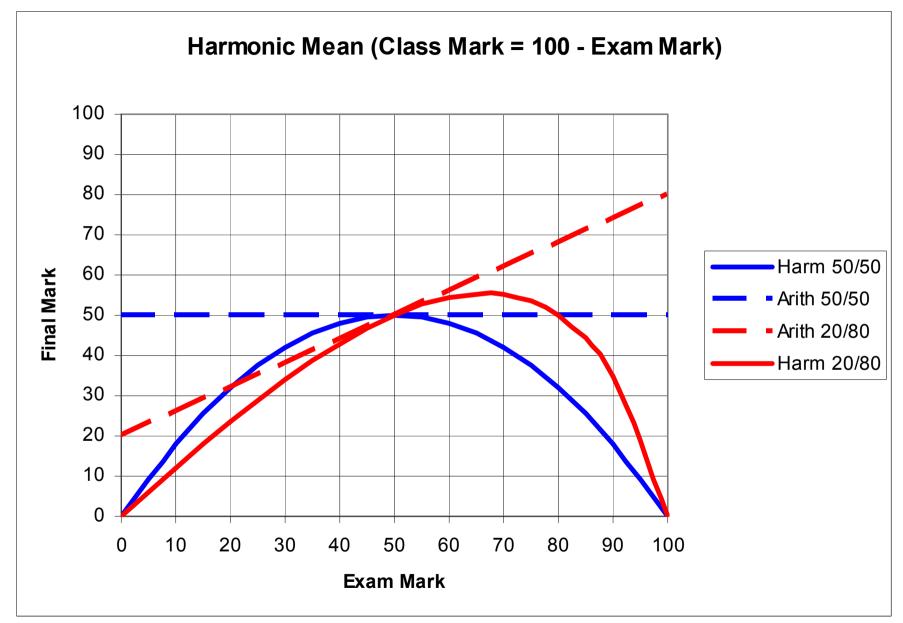
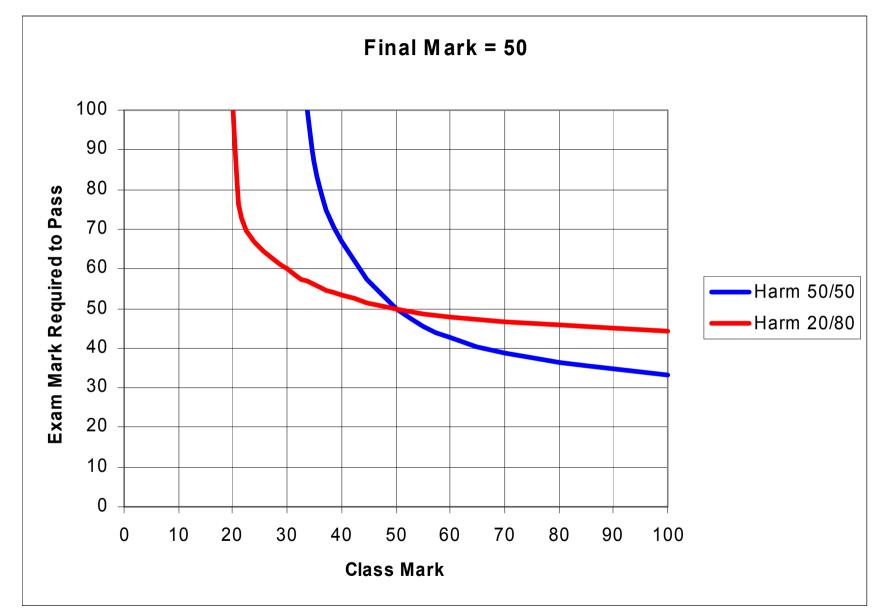$$M = \max\left(\frac{2E\,C}{E + C} ; \frac{5E\,C}{E + 4C} \right)$$

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Assessment

- If E < 40

$$M = \min\left(44, \frac{2EC}{E+C}\right)$$

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Harmonic Mean (Class Mark = 100 - Exam Mark)
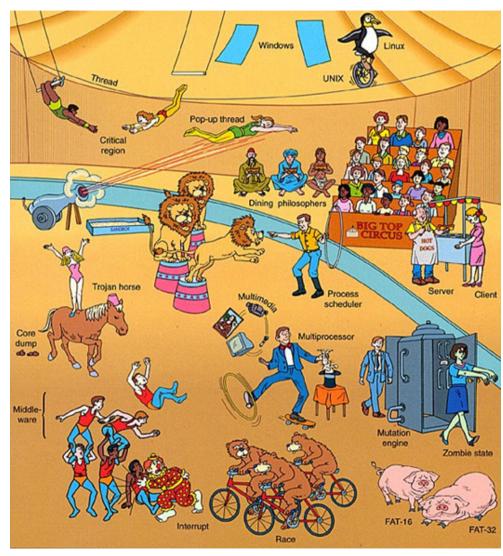
Final Mark = 50

Assessment

- You need to perform reasonably consistently in both exam and class components.

- Harmonic mean only has significant effect with significant variation.

- Reserve the right to scale, and scale courses individually if required.
    - Warning: We have not scaled in the past.

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Textbook

- Andrew Tanenbaum, *Modern Operating Systems,* 3rd Edition, Prentice Hall

References

- A. Silberschatz and P.B. Galvin, *Operating System Concepts*, 5th, 6th, or 7th edition, Addison Wesley

- William Stallings, *Operating Systems: Internals and Design Principles,* 4th or 5th edition, Prentice Hall.

- A. Tannenbaum, A. Woodhull, *Operating Systems--Design and Implementation*, 2nd edition Prentice Hall

- John O'Gorman, *Operating Systems*, MacMillan, 2000

- Uresh Vahalla, *UNIX Internals: The New Frontiers*, Prentice Hall, 1996

- McKusick et al., *The Design and Implementation of the 4.4 BSD Operating System*, Addison Wesley, 1996

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Consultations/Questions

- Questions should be directed to the forum.
- Admin related queries to Nicholas Fitzroy-Dale nfd@cse.unsw.edu.au
- Personal queries can be directed to me kevine@cse.unsw.edu.au
- We reserve the right to ignore email sent directly to us (including tutors) if it should have been directed to the forum.
- Consultation Times
  - TBA

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Course Outline

- "the course aims to educate students in the basic concepts and components of operating systems, the relevant characteristics of hardware, and the tradeoffs between conflicting objectives faced by operating systems in efficiently supporting a wide range of applications."

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Course Outline

- Processes and threads
- Concurrency control
- Memory Management
- File Systems
- I/O and Devices
- Security
- Scheduling

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