

**UCT Department of Computer Science** 

# An Invitation to Computer Science



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#### What is half of 2 + 2?

2(4+3)+++(4+12)=-2(4+10)++(4+6)+3(24+8) 3(2x+5y)+-2(4x+6y)=4(9x+5y)+-3(2x+4y)+2(4 6x+15y+-8x+-12y = 36x+20y+-6x+-12y+-8x+1 5 a + 15 b = -3a + 12b + - 12a + 16 + 9 = 30m+-35n+-15m+-18n+-2 44-62)= 4(4x-64-72)-2(2+7x+34







## Puzzle 1

A man has to take a wolf, a goat, and some cabbage across a river. His rowboat has enough room for the man plus either the wolf or the goat or the cabbage. If he takes the cabbage with him, the wolf will eat the goat. If he takes the wolf, the goat will eat the cabbage. Only when the man is present are the goat and the cabbage safe from their enemies. All the same, the man carries wolf, goat, and cabbage across the river. How?



### Puzzle 2

You have just moved into Tugwell and discovered that there are 3 light switches on the first floor that control 3 halogen floor lamps on the 10<sup>th</sup> floor. And the lift is broken! How can you determine which switch controls which light by making only one trip to the 10<sup>th</sup> floor?







### Puzzle 3

3 skollies are caught stealing a set of 5 almost identical soccer jerseys (3 say "sundowners" on the back and 2 say "chiefs"). They are given one last chance to avoid punishment. They are made to stand in a queue and, in the dark, each is given a jacket to wear. The other 2 jackets are hidden away. When the lights are turned on, they are told that whoever guesses which jacket they are wearing can go. The third skollie can see the first and second jackets, the second skollie can see the first jacket and the first skollie can see nothing. After a few minutes of silence, the first skollie correctly shouts out what is written on his jacket. What is it? How?



#### I did not come here for games ...

# Now what is this Computer Science thing anyway???





## 5 Branches of Computing

#### Computer Science

- Foundations and principles (software)
- Information Systems
  - Business processes & information
- Computer Engineering
  - Hardware and communications
- Software Engineering
  - Software development processes
- Information Technology
  - Application of computing

Reference: ACM Computing Curricula: Overview



## Computing at UCT

#### Department of Computer Science (Science Faculty)

#### Offers BSc degrees in Computer Science

- Department of Information Systems (Commerce Faculty)
  - Offers BCom degrees and BBusSci degrees in Information Systems
- Department of Electrical Engineering (Engineering Faculty)
  - Offers BSc (Eng) degrees in Electronic Engineering or Computer Engineering



#### Why Computing is Important 1/5

Earth Simulator Centre in Japan provides advance notice of natural disasters to preserve human life!



Reference: http://www.es.jamstec.go.jp/esc/eng/



### Why Computing is Important 2/5

Computer Aided Tomography (CAT scans) are computer-reconstructed views of the internal organs that help in diagnosing patients.



Reference: Wikipedia







## Why Computing is Important 3/5

## The world's information is available at our fingertips!







#### Why Computing is Important 4/5

#### Games, Movies, WhatsApp, Facebook ...



Reference: World of Warcraft, The Burning Crusade, Blizzard Entertinment







## Why Computing is Important 5/5

1.5 trillion dollars are spent every year in online purchases around the world!



## What is Computer Science?

#### Computer Science (CS) is the study of:

- Computer software
- Algorithms, abstractions and efficiency
- Theoretical foundation for computation

#### What you learn in Computer Science:

- Principles of computation
- How to make machines perform complex tasks
- How to program a computer
- What current technology exists and how to use it
- Problem solving

## The Computer Science degree

#### Focuses on:

- Programming
- Problem solving
- Abstractions
- Logic
- Practical skills and technology
- Deep understanding of technology





#### Computer Science @UCT topics

CS1

- Problem solving and programming in Python
- Object-oriented design in Java

CS2

 Data structures, databases, HCI, parallel computing, computer architecture, software engineering, (game development)

CS3

- Operating systems, networking, functional programming, compilers, algorithms, advanced software engineering, (C++, machine learning, game development)
- CS Honours: a whole lot of cool stuff ...

UNIVERSITY OF CAPE TOWN

## Why study Computer Science?

- ...as a Major (everyone should do Intro Prog!)
- Most exciting discipline
- Phenomenal growth, "made countries"
- Can make lots of money (Apple?)
- Can get famous (Gates?)
- Can study further or even teach
- Complementary to almost any other discipline
- One major for fun; one for a career

## Why Study CS @ UCT

- Degree accredited by British Computer Society (international curriculum)
- CS department ranked highest in country
- Innovative teaching (Games course, Research course, etc.)
- Diverse staff interests
- Enthusiastic staff and students!



#### 25 MOST DESIRABLE JOBS IN AMERICA

Glassdoor's "Best Jobs for 2015" report identifies 25 specific jobs with the highest overall Glassdoor "Job Score," based on a 5-point scale (5.0=very high, 1.0=very low).

The Glassdoor Job Score is determined by weighting three factors equally: earning potential (average annual base salary); career opportunities rating; and the number of open job listings. Results represent job titles that rate highly among all three categories.

RANK	J	IOB TITLE	JOB SCORE	AVERAGE BASE SALARY	CAREER OPPORTUNITIES RATING	NUMBER OF JOB OPENINGS
1.	- <i>⊪</i> ⊢ P	hysician Assistant	4.8	\$111,376	3.5	45,484
2.	🖺 S	oftware Engineer	4.6	\$98,074	3.3	104,828
3.	🖍 В	usiness Development Manager	4.6	\$94,907	3.6	11,616
4.	А. н	luman Resources Manager	4.6	\$96,443	3.6	8,073
5.	<u>lut</u> Fi	inance Manager	4.6	\$122,865	3.4	9,728
6.	Q N	Aarketing Manager	4.6	\$100,130	3.4	14,647
7.	므 D	atabase Administrator	4.5	\$97,835	3.4	9,790
8.	<u></u> ₽ P	roduct Manager	4.5	\$113,363	3.3	10,294
9.	井D	ata Scientist	4.4	\$104,476	3.8	3,449
10.	<b>\$</b> S	ales Manager	4.4	\$76,556	3.3	26,193
11.	🖥 S	olutions Architect	4.4	\$121,657	3.4	3,982
12.	ØΝ	Nechanical Engineer	4.4	\$73,015	3.3	16,065
13.	🗸 Q	A Engineer	4.3	\$77,499	3.2	26,383
14.	ρв	usiness Analyst	4.3	\$74,638	3.2	21,337
15.	🕛 E	lectrical Engineer	4.3	\$76,803	3.3	10,435
16.	ΥN	letwork Engineer	4.3	\$87,518	3.2	14,092
17.	<del>14</del> C	ivil Engineer	4.3	\$73,383	3.5	6,120
18.	🗹 A	udit Manager	4.3	\$69,271	3.9	4,585
19.	i P	hysical Therapist	4.3	\$64,806	3.2	27,579
20.	@ II	r Project Manager	4.3	\$103,710	3.2	5,700
21.	@ C	lient Services Manager	4.2	\$103,736	3.7	2,377
22.	₿s	upply Chain Manager	4.2	\$83,795	3.4	3,754
23.		Nobile Developer	4.2	\$79,810	3.3	4,651
24.	₽, N	lurse Practitioner	4.2	\$95,171	3.1	15,341
25.	¢≇ s	ales Engineer	4.2	\$91,318	3.2	6,007

For a job title to be considered for this list, it must receive at least 75 salary reports and at least 75 career opportunity ratings shared by U.S. based employees over the past year on the Glassdoor website. The number of job openings per job title represents the total number posted on Glassdoor over the past three months.

**BUSINESS INSIDER** 

... but will I get a job?



Source: Glassdoor



#### What does a CS graduate do?

- Not just sitting in a dark room by a terminal
- Learn by doing
- Variety
- Helping people
- Entrepreneurial
- No `one' career







## What do I need to get in?

- High school Mathematics!
  70% in NSC
- 60% in Physics or IT if you want a BSc (otherwise you can get a BCom or BA)
- Everything else we will teach you.
- No Matric IT needed!
  - Seriously, we can teach this stuff better :)



### So what degree do I apply for?

- BSc with a major in Computer Science
- BBusSci with a specialization in CS
- BCom with a specialization in IS+CS
- BA with a major in Computer Science





#### Interested?

ask questions or find me later

- hussein@cs.uct.ac.za
- OR simply ask at the Computer Science stall in Jameson Hall today

#### Questions? Questions? Questions?



