βeta

— news from computer science and engineering —

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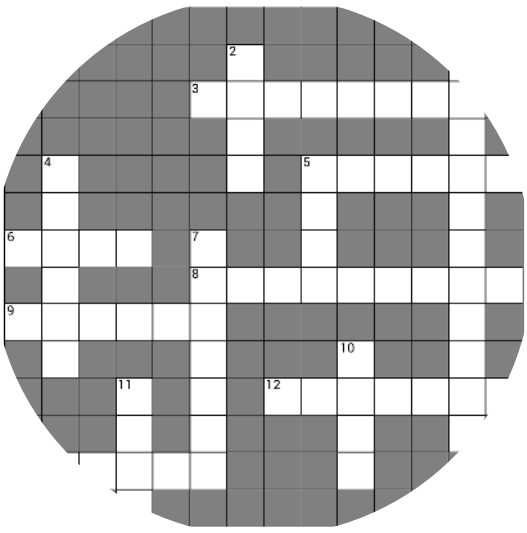

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βeta

About CSESoc βeta

CSESoc βeta is published fortnightly
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Find us online at
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2015 issue 103

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In This Issue

2015 CSE Student Representatives

The stureps (student representatives) are a body of students, voted in by students, whose main purpose is to help facilitate communication between the staff and students at CSE. They report to the School (unlike student societies).

This is an important role and only students with enough time and commitment should stand for election. The period will be for one year.

There are a number of things which Stureps can help students with, such as:

- Ideas for improving things at CSE;
- Providing anonymous complaints to CSE;
- Representing students on the CSE Teaching and Computing Committees;

The stureps can help you find the right person, or speak to them on your behalf. All communication with them will be kept confidential unless otherwise specified.

Voting is now open for the 2015 CSE Student Representatives:

- Year 1 reps (2 positions)
- Year 2 reps (2 positions)
- Year 3 reps (2 positions)
- Year 4 and above reps (2 positions)
- Postgrad reps (2 positions) (no nominations)

Voting will close 18th March 2015 at 1pm. You may vote as many times as you like, but only your last vote will be counted.

If some years have two or less candidates we still require them to be elected to indicate if they have support.

To vote, head to
`my.cse.unsw.edu.au/election.php`

About Our Sponsors

ARC UNSW `arc.unsw.edu.au`

Arc is your student organisation. Our mission is to make your life at Uni more interesting, more fun, more personally rewarding, and ultimately more affordable. We're here to provide everything you need outside of the classroom.

UNSW Faculty of Engineering `eng.unsw.edu.au`

The Faculty of Engineering at UNSW is recognised as the pre-eminent Engineering faculty in Australia and offers the widest choice of engineering courses in a wide range of specialisations. Although it has grown to include a broad range of disciplines, engineering remains one of its largest and most important faculties.

CSE UNSW `cse.unsw.edu.au`

CSE is now one of the largest Schools within the University, and one of the largest of its kind in Australia. The school's Development Office was established in 2001 to promote the development of our students beyond their academic studies. It has always been a great supporter of student societies, which is one of the reasons our students enjoy a complete and fulfilling university life.

Accenture `accenture.com`

Accenture is a global management consulting, technology services and outsourcing company, with more than 319,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world's most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments.

There's no limit to the technical or business solutions Accenture deliver, the clients they work with, or the type of work that they take on. Accenture work with Australia's most innovative organisations across all sectors, including banking, insurance, healthcare, mining, retailers, communications, media, and governmental agencies.

Atlassian `atlassian.com`

Atlassian unlocks the potential in every team. Our products help teams collaborate, build software and serve their customers better. Nearly 40,000 large and small organizations—including Citigroup, eBay, Coca-Cola, Netflix and NASA—use Atlassian's tracking, collaboration, communication, service management and development products to work smarter and deliver quality results on time. Learn about products including JIRA, Confluence, HipChat, Bitbucket and Stash at atlassian.com.

Freelancer `freelancer.com.au`

Triple Webby award winning Freelancer.com is the largest freelancing and crowdsourcing marketplace in the world. Freelancer.com connects over 10.4 million independent professionals globally, specialising in nearly 600 fields.

Over 5 million projects have been posted to date, in areas as diverse as website development, logo design, marketing, copywriting, astrophysics, aerospace engineering and manufacturing. Freelancer.com is the marketplace where the world gets work done.

Google `google.com/careers/students`

Google is and always will be an engineering company. We hire people with a broad set of technical skills who are ready to tackle some of technology's greatest challenges and make an impact on millions, if not billions, of users.

At Google, engineers not only revolutionise search, they routinely work on massive scalability and storage solutions, large-scale applications and entirely new platforms for developers around the world. From AdWords to Chrome, Android to YouTube, Social to Local, Google engineers are changing the world one technological achievement after another.

Voted the top Graduate Employer by students in Australia, we're looking for students to do cool things that matter. Join us. Visit `google.com/careers/students`

Jane Street `janestreet.com`

Jane Street is a proprietary trading firm that operates around the clock and around the globe. We bring a deep understanding of markets, a scientific approach, and innovative technology to trade in the world's highly competitive financial markets, focusing primarily on equities and equity derivatives. Founded in 2000, Jane Street employs over 320 people in offices in New York, London and Hong Kong.

Microsoft `microsoft.com/university`

Microsoft is organized into several major functions and disciplines to deliver exceptional devices and services to billions of people and millions of businesses worldwide. Individual but connected, we work in small teams to focus on a specific function or discipline. Then those teams collaborate with one another to ensure compatibility and communication across our inventions.

What this means for you is depth and breadth of opportunity. We offer a variety of jobs, spanning our many technologies in offices around the world. Come to Microsoft to meet and learn from interesting and talented people, and to make a real impact on the world.

Palantir `palantir.com`

Palantir is a software company that builds and sells data fusion platforms and applications for solving large, complex data problems. Our work involves building the infrastructure to fuse together disparate data sources into a single, coherent, interactive, human-understandable picture of a real world problem.

We solve big data's 'last mile' problem with engineering that is equal parts large-scale data processing and high-quality user interface. Our systems are broadly deployed in government, financial, and commercial markets. Additionally, our philanthropy team donates our software and expertise to help non-profits work through their challenging data analysis about pressing problems facing our world today.

Facebook `facebook.com/careers`

Facebook was built to help people connect and share, and over the last decade our tools have played a critical part in changing how people around the world communicate with one another. With over a billion people using the service and more than fifty offices around the globe, a career at Facebook offers countless ways to make an impact in a fast growing organization.

Want to build new features and improve existing products that more than a billion people around the world use? Interested in working on highly impactful technical challenges to help the world be more open and connected? Want to solve unique, large-scale, highly complex technical problems?

Our development cycle is extremely fast, and we've built tools to keep it that way. It's common to write code and have it running live on the site just a few days later. We push code to the site everyday and have small teams that build products that are touched by millions of people around the world.

Optiver `optiver.com`

At Optiver, we like to think we're different. We're a leading global independent market maker dealing mainly in derivatives, shares and bonds. Our Trading and IT teams work together as the right and left hand of the business and it is this level of integration that keeps our Traders at the top of their game. Our speed to the market is crucial to our success and this is why we concentrate on sourcing the most advanced software, the fastest applications and up to date technology.

We value the talents of our team and foster a collaborative and innovative working environment which nurtures brilliant minds. This is why we've been listed in BRW's Best Place to Work List, coming in at #1 in 2013 and #2 in 2014.

ResMed `resmed.com.au`

We are the global leader in the design, manufacture and distribution of innovative products for the diagnosis, treatment and management of respiratory disorders. We have experienced sustained and significant growth since inception. One of the principal contributors to this growth is innovation reflected in a commitment to producing world-class product lines.

Woolworths IT `wowgrads.com.au`

Technology is a game changer for any retail organisation. Woolworths is step-changing the way IT supports the business to meet the customers' changing needs. We are at the forefront of innovation and we love making things better through technology. Woolworths IT has a large portfolio of over 300 programs / projects underway and a team of 1000+ across IT.

Our Google and Ebay projects are just two to mention that have shaped how we deliver great experience through technology to our customers and people. Opportunities are wide and diverse, ranging from but not limited to; Analysis, Program Management, Infrastructure, User Experience, Web / App Development and design.

Dare to Lead. `www.wowgrads.com.au`

LaTeX: a document preparation system

. . . and why it should matter to you.

One thing that you'll likely come across (or certainly come across, if you do algos) during your time in computing is LaTeX. Like so many other things in industry, academia, and computing, there is no mention of it until there is an expectation that you already know the program. So what is LaTeX?

At its core, LaTeX is a program that allows you to create documents for other people to read (in fact, this document it rendered in LaTeX!). In that respect it is similar to Word, but that's about the only way. Unlike Word or its analogues, which require a specific program to be run, LaTeX document generation generally starts with any old text editor (from Vim, to gedit to something more specialised), which is used to edit a LaTeX source file (a `.tex` file). This source file is then run through the LaTeX program to convert it to a document format, e.g. PDF. At this stage you're ready to send the finished product to whoever you like (or reformat it if you realise that you've made a terrible mistake).

The biggest difference between Word and LaTeX is the presence (or rather, absence) of a GUI. Word is all about making things pretty, and letting you see it, as soon as you write them, whereas in LaTeX
you write things, and only once you've converted it do you see the finished product. This is a mixed blessing; it allows LaTeX to be more flexible (want to change the spacing? Change the flags for the conversion process), but less obviously usable to an audience unused to it. The various pros and cons are discussed later in this article.

What's in a name?

LaTeX's name is, really, one of the most frustrating things about it. As well as making it hard to Google without bringing up results full of fetish gear, the pronunciation will drive you crazy while you're getting used to it (though I'll talk more about that later). But at least it isn't called Elm like everything else seems to be.

Typography Using a generally infeasible combination of capitalization, font sizing, and baseline offsetting, LaTeX is often (and officially) written: LaTeX. There is a reason for this bizarre arrangement of letters, I promise; its in part to distinguish it from the aforementioned rubber-like substance, but mostly to show off what is possible in LaTeX. If this were a Word document, that would have to be an embedded image; so much more frustrating to work with. (Of course, if you can't do that, `LaTeX` works just fine, but doesn't look nearly as good.)

Pronunciation This is a make-or-break thing in certain groups (I know, it's absolutely stupid); the generally accepted pronunciation is "*LAH-tek*". Whatever you do, don't pronounce the second syllable "*teks*", or call it latex. It is not a rubbery substance, and Knuth may jump down from the ceiling and glare at you.

Etymology Like so many other things, it was Donald Knuth who first created "TeX" (the three characters actually being uppercase Greek tau, epsilon, and chi). This Greek forms the root of English words like "technical" and "technique", and the choice to group TeX with this was a conscious one. Later, Leslie Lamport built "LaTeX" on top of TeX, presumably prepending "La" because "Lamport's TeX" was too long.

The mascot of TeX and LaTeX; drawing by Duane Bibby

Pros of LaTeX

So now we have a brief idea of what LaTeX is, why do people use it?

Typogaphic quality A great reason to use LaTeX (aside from all the other pros in this list) is that it produces beautiful documents. You can fine tune your line spacings, the inbuilt fonts are professional The main reason I use LaTeX is it produces output that is, typographically, far better than any of the alternatives. LaTeX has excellent built-in fonts, good algorithms for automatic spacing, and the ability to fine-tune the spacing arbitrarily. Bad typography gives a bad first impression, and reflects poorly on the content of a document.

Portability LaTeX is the single most portable document creation system of them all, running on just about every operating system in existence. Comparatively, Microsoft Word only works on Windows and Mac, and even OpenOffice runs on all Unix breeds.

Version control Because `.tex` files are plain text, you can use Git, diff and a variety of other tools to look at the change history. Far easier than the complex systems (or lack thereof!) used elsewhere.

Document longevity LaTeX documents are functionally timeless: those written 10 years ago still work and still produce (mostly) the same output as they did at the start. By contrast, Word documents are typically useful only for 3–4 years, before they stop working properly on new versions.

Mathematical typesetting Unlike other systems, maths can be input inline, and doesn't skew line width formatting. Beautiful.

(Seriously, have you tried Word's "Equation" "Editor"? Abominable. —Ed.)

Macros LaTeX lets me define macros, canned sequences of text and/or markup, that I can then use repeatedly. It's much better than copy-and-paste, since it can be changed by changing just the definition, plus I don't have to find the original each time.

Peer pressure In academic publishing (my data is, admittedly, limited to computer science and physics) you're often not taken seriously unless you use LaTeX. As far as incentives go to use LaTeX, that's often the strongest of them all.

Cons of LaTeX

So given all of the great things about LaTeX, why doesn't everyone use it?

Fragmentation Writing a document with LaTeX means using an editor, LaTeX itself, a document previewer, and usually a few other assorted programs. In contrast, Word and other such programs are self contained.

Learning curve Learning markup commands takes time, and can initially be a really frustrating endeavour (like learning any new programming language). I'd recommend using a helpful GUI to start, before moving on to vim or similar—if you want. Some of the GUIs are great to stay with forever.

Preview delay There's a delay between typing something in the editor and seeing the result in the document previewer; depending on how often you preview, this can be a long or short gap and more or less frustrating.

Syntax errors Like in all programming languages, it's absolutely possible to create a `.tex` file that LaTeX will reject, complaining of a syntax error (and aren't they just your favourite). Unfortunately, the errors are often cryptic, and take some headbanging to fix. There's definitely a learning curve in dealing with them!

Overall, I'd recommend using LaTeX, because once you're over the initial frustration with it, it's a highly useful skill to have. Programs such as TeXstudio (available for all OSes) are a nice combination of helpful but not coddling, and take a lot of the more frustrating guesswork out of the process. So write an assignment in LaTeX this sem, or convert an old project into LaTeX as an experiment. Though it will probably be frustrating, it will (probably) wind up being fun, and look amazing.

```
\end{document}
```

■ *Emily Saunders Walmsley*

The Laws of Public Transportation

First Law. Your conveyance of choice shall always be an amount of minutes late whereby it is of greatest convenience to you without also allowing you to seem justified in complaining about it

Second law. Thy bus driver shall always be grumpy, unless you yourself are grumpy, in which case your driver shall be annoyingly chirpy.

Third law. If, and only if, you are relying on your transport being the usual seven-to-ten minutes late it will, invariably, be driven by the only public transport officer in the Greater Sydney area capable of running ahead of schedule.

Fourth Law. Thy bus shalt always be running on time when you are desperately late. It shall then proceed to skip thy stop.

Fifth Law. Thou shalt forget thy headphones only when there is a particularly gargantuan group of tourists being unreasonably loud sharing thy mode of transportation.

Sixth Law. When traveling late on a Friday or Saturday night, or early the following morning, you will be forced to sit next to the very hungover individual who will likely throw up at least once during the journey. Plan accordingly.

Seventh Law. You shall receive an incredibly important phone call at the least optimal time possible for your current journey. Examples of said inconvenience may include while your train goes through a tunnel as an indeterminatly large group of people attempt to sing *Blank Space* by Taylor Swift, or have a violently passionate argument about their knowledge of llamas.

Eighth Law. Thou shalt never be able to comprehend the guards announcements, until such a time as your train has left the platform you intended to get off at.

■ *Fraser Metcalf*

Upcoming Events

every Monday CSESoc's Weekly Barbecue social
1–2p, Physics Lawn

Come on down to the Physics Lawn for your weekly dose of free barbecue! Don't forget to pick up your copy of CSESoc βeta, and make some new friends!

16 March Accenture presents "Styles to Success" careers
2–3p, K17 Seminar Room

Do you have the communication skills necessary to work in the tech industry? Accenture will be on campus to run a workshop on communication styles and techniques.

For more details, head to
`csesoc.unsw.edu.au/blog/accenture-presents-styles-to-success`

18 March 15s1 CSE Careers Expo careers
12.30p–4.30p, K17 Level 1

This is the main-round expo for CSE Students graduating this year as many companies will be closing their graduate recruitment applications in the next few weeks. Many companies will also be providing information about internships and other opportunities as well, so students from all years are welcome.

This is our biggest Expo ever, with 15 companies attending and all looking for CSE students to work for them. There will be booths in the K17 Level 1 Foyer, Room 103 and the seminar room from 12:30-4:30pm.

For more details, including the list of participating companies, head to:
`cse.unsw.edu.au/engage-with-us/industry-partners/careers-expo/careers-expo-2015s1`

18 March Lambda, the Ultimate Config Format tech
10-11a, K17 Seminar Room

Complicated systems require expressive configuration languages. But language design is hard; it's no surprise that many applications have either limited configurability or an unwieldy configuration format with complex semantics.

At Jane Street, we have seen this problem enough times that we decided to start writing our configs the same way that we write our code, in OCaml. In this talk, we'll discuss our experiences using ocaml-plugin, a library we developed to embed OCaml within an application, providing a configuration language that is both expressive and familiar.

For more details, head to
`csesoc.unsw.edu.au/blog/jane-street-technology-talk-lambda-the-ultimate-config-format`

18 March Jane Street Networking Event careers
5p, The White House

You are invited to a networking event with Jane Street on Wednesday, March 18 at 5:00pm at the Whitehouse (Fig Tree precinct, Gate 4, High Street, Kensington).

There will be 3 representatives from Jane Street who will meet and greet with CSE students over food and drinks.

For more details, head to
`csesoc.unsw.edu.au/blog/jane-street-networking-event`

20–22 March First Year Camp social
Wombaroo Adventure Centre

Hey, first years! Want to get away from uni for a weekend to a tropical paradise? Make plenty of new friends and share some awesome experiences? Come along to CSESoc's Tropical-themed First Year Camp, from March 20th to 22nd.

Sign up online at
`csesoc.unsw.edu.au/first-year-camp`

24 March Accenture: Women in Technology careers
6–8p, Ananas Bar, The Rocks

Accenture is launching a brand new program called Women In Technology. As part of this program we're running a series of events throughout the year to connect the best and brightest STEM students with successful women working in the technology industry. Events include informal networking opportunities as well as campus workshops designed to deepen your knowledge in the world of technology, and we'd like you to be involved!

The first event to kick off the series will be a networking evening giving participants the opportunity to meet some of Accenture's Technology experts over drinks and canapes.

For more details, head to
`csesoc.unsw.edu.au/blog/accenture-women-in-technology`

26 March Introduction to the UNIXVerse tech
4p, K17 Seminar Room

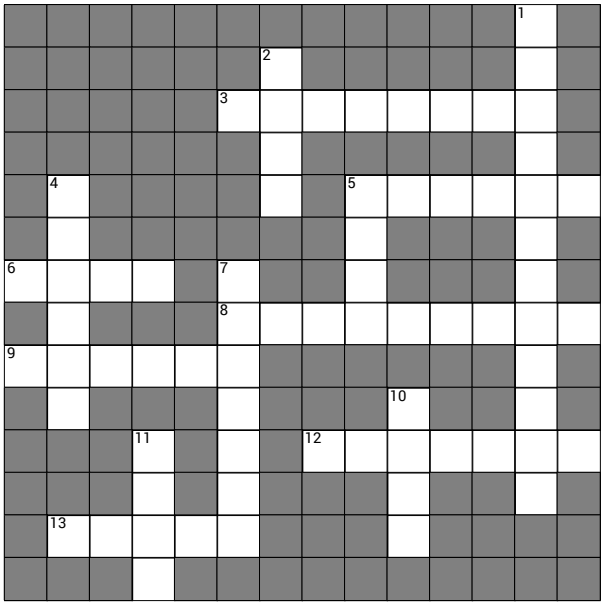
You've started using Linux, but you're confused. What do all these commands do? Why does everyone use terminals?

Come to the K17 Seminar Room on Thursday 26th March at 4pm to be introduced to the UNIXVerse, and learn how to live your life inside the (UNIX) shell.

For more details, head to
`csesoc.unsw.edu.au/blog/introduction-to-the-unixverse`

Puzzles

Crossword



Across. 3 "apt-get install" **6** Wriggly bootloader **8** Allows you to use PacMan whilst doing work **9** "The Universal Operating System" **12** *box **13** Short, user friendly desktop environment

Down. 1 Makes up an OS. Also, binomial ____. **2** Pentesting distro **4** At the centre of an OS **5** Unix shell, good for percussive maintenance **7** Documentation galore, commandline accessed **10** ____ make me a sandwich. **11** Superuser, like carrots

Brain Teasers

A. Write a Linux kernel module, and stand-alone Makefile, that when loaded prints to the kernel debug log level, "Hello World!" Be sure to make the module unloadable as well! (This problem was taken from `eudyptula-challenge.org`; it's great fun and I'd thoroughly recommend signing up for it.)

B. There is a pile of twelve coins, eleven of which are real and one of which is a counterfeit. The counterfeit coin will be either heavier or lighter than the other coins, which are all of equal weight. To find the counterfeit coin, you have a balance scale to place the coins on. In only THREE weighings, find which coin is counterfeit and whether it is heavier or lighter.

C. Find the maximum area of a rectangle inscribed in a unit circle.

Takuzu

The goal of this problem is to fill the grid with 1 and 0. The rules of the game are:

1. each line has the same number of 1s and 0s;
2. no more than two consecutive cells may contain the same digit; and
3. each row and each column have to be unique.

	1		0			1			
	1	1		1					0
									0
1				1		0			
			0				1		
				1				0	
			0		0				
1		1					1		
1				1				0	
	0						1		

Issue 102 Solutions

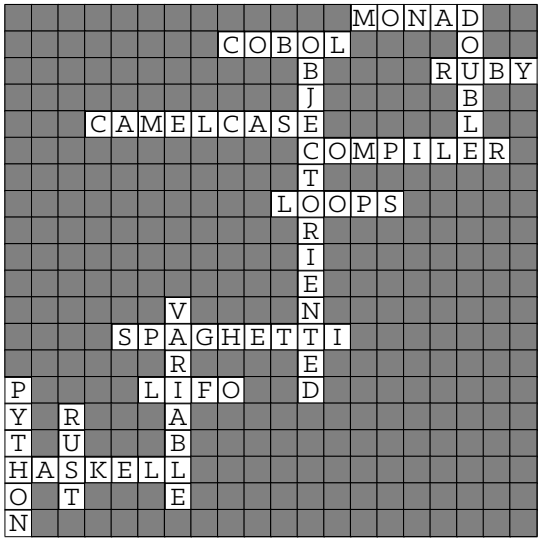
Brain Teasers

A. `0x77D` **B.** `Hello World!`

Takuzu

0	1	0	0	1	1	0	1	1	0
0	1	1	0	1	0	0	1	1	0
1	0	0	1	0	1	1	0	0	1
0	0	1	0	1	1	0	0	1	1
1	1	0	0	1	0	1	1	0	0
0	1	0	1	0	0	1	0	1	1
1	0	1	1	0	1	0	1	0	0
0	1	0	0	1	1	0	1	0	1
1	0	1	1	0	0	1	0	1	0
1	0	1	1	0	0	1	0	0	1

Crossword



■ *Emily Saunders Walmsley*