NEWS FROM COMPUTER SCIENCE AND ENGINEERING

βETA

Free as in speech and our awesome BBQs.

FEATURED
Journey Through Abstraction

So disclaimer: if you don't like pseudo-epiphanies and things getting a bit meta, this article may not be for you. I'm writing it loosely from the headspace of a first-year philosophy student, where an apple is only a flawed instantiation of the true eternal form of an apple and is therefore not an apple. Unless we're talking about an Aristotelian apple, in which case an apple is just an apple. But I don't intend to inflict that level of pretension on you. What I mean is, I'm going to be talking about things in fairly general, conceptual terms.

So, along with every other student who goes through the computer science pipeline, I've long since appreciated the crucial role of abstraction in understanding computing. In fact, if I had to use one word to characterize software or computer systems, it'd be abstraction. I'm talking more about abstraction as a general concept, not necessarily in the context of object-oriented programming or as any particular technique. Abstraction deals with representing data and programs at a higher level, hiding away implementation details. This allows modules to be used with only the knowledge of 'what' it can do, and not the underlying implementation. Likewise it allows data to be used without knowing its underlying representation. Given our limited mental real-estate, this is absolutely critical for making sense of complex systems.
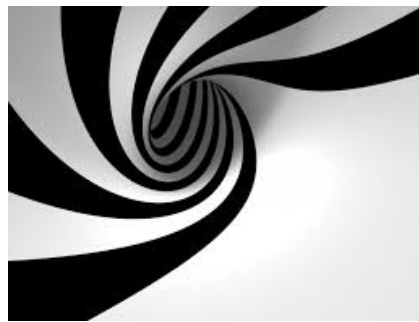
Why is computer science so saturated with jargon? The reason is the jargon corresponds to abstractions we intuitively make to understand things. Trees and graphs are a staple of computer science because of their immense utility in representing diverse real-world problems. Take any canonical example: finding the shortest route between two cities, deciding on a good strategy for noughts and crosses, or a bunch of resource allocation problems. We can ignore the real-world details of these different domains and concentrate instead on a simple abstract construct. We can leverage the familiar set of operations that come with these domain-independent objects. That is pretty rad.

Nowhere is this penchant for abstraction as comically ubiquitous as in mathematics. Some casual wikiing lead me recently to the soul theorem. If (M, g) is a complete, connected Riemannian manifold with sectional curvature $K >= 0$, then there exists a compact totally convex, totally geodesic submanifold S such that M is diffeomorphic to the normal bundle of S. The percentage of words understood in that sentence would be a good test of sex life over the last 6 months. My percentage is roughly 50%, which also happens to be the proportion of logical connectives ("If", "then", etc). So I get the worst of both worlds. But I digress.

Journey Through Abstraction - contd.

The original inspiration for this article was considering the layers of abstraction involved in a computer program. We can begin by writing a (comparatively) high-level program in C. This exists abstractly and can be trivially edited. The cross-platform C code is then compiled into architecture-dependent assembly code. Each such assembly instruction performs some (fairly) atomic operation. The assembly code is then converted into executable machine code by an assembler, relinquishing the last attempt at human-readability and entering into the binary world of the machine. Each instruction is now a sequence of 1s and 0s that defines key things like the opcode and the operands.

We have now reached the hardware. But, we are still several tiers of abstraction above the "real", physical mechanics of program operation. The sequence of 1s and 0s are fetched from memory and interpreted by the CPU. This involves decoding the instruction, fetching related operands from memory, loading registers, performing any arithmetic or logical operations, and incrementing the program counter. How do we describe the hardware components that do this? We use abstractions like logic gates and propositional logic. Ultimately, the 1s and 0s become different voltage levels in the electronic circuitry which makes up this hardware. However, this is the domain of the matrix-coat-wearing electrical engineers, so I'll stop talking.

So abstraction is clearly a powerful conceptual tool. But it does come with a cost. I liked assembly. It may have taken ~1000 lines to display text, but you can see everything, and the interaction between different components is completely transparent. By contrast, higher-level languages obscure much behind black boxes. And when abstraction becomes pathological, things can actually get more complex. We see necessary evils like convoluted build systems and a dizzying array of "time-saving" automation tools.

Granted, this point didn't coherently fit into the rest of the piece. I'm meant to be espousing the power of abstraction, not its shortcomings. However, I write what I want. I'm the writer. Dicks. I flaunt the rules and smirk at convention.

I realise, for the initiated, this article presents no hugely startling insights. That said, there is a certain beauty to how high-level code becomes electrical pulses. So much so, I thought: I 'beta' talk about it. Just like to direct your attention to the use of wordplay there. I'm a pretty funny guy. Some would say gifted. So yeah, abstraction. That's what it's all about.

NELSON RIGBY

Women in Engineering

So recently I came across a book, *Lean In: Women, Work, and the Will to Lead* by Sheryl Sandberg. This book explains and shares the hardship women face in the work force stating that thirty years after women became 50 percent of the college graduates in the United States, men still hold the vast majority of leadership positions in government and industry. This means that women's voices are still not heard equally in the decisions that most affect our lives. In Lean In, Sheryl Sandberg examines why women's progress in achieving leadership roles has stalled, explains the root causes, and offers compelling, commonsense solutions that can empower women to achieve their full potential.

In Australia, only 9.6 percent of engineers are women (Source: Engineers Australia Statistical Overview, 2009). More than half of these women are under 30 years of age and only 15 percent of women over 40 are still working in the profession. In Australian universities, the enrolment rate of women in degree engineer courses has remained around 14 per cent since the early 1990s peaking in 2001 at 15.7 percent. The number of women in technologist courses or 2-year TAFE diplomas is even fewer. However, there are good reasons for women to consider a career in engineering some specific to women as a group, other reasons which apply to students as a whole.

Why women should consider engineering

As a group, women comprise over 50 percent of Australia's population. They are also a major consumer group within Australian society.Having more women working as engineers can bring different perspectives to the profession and enable project teams to generate more creative solutions that better address and meet society's needs and the particular needs of women. By attracting more female engineers, companies gain better understanding of their customers' needs, improve product designs, and can compete more effectively in the marketplace.

In Lean In, Sandberg digs deeper into these issues, combining personal anecdotes, hard data, and compelling research to cut through the layers of ambiguity and bias surrounding the lives and choices of working women. She recounts her own decisions, mistakes, and daily struggles to make the right choices for herself, her career, and her family. She provides practical advice on negotiation techniques, mentorship, and building a satisfying career, urging women to set boundaries and to abandon the myth of "having it all." She describes specific steps women can take to combine professional achievement with personal fulfillment and demonstrates how men can benefit by supporting women in the workplace and at home.

I recommend that both gender groups read this book, which is a real eye opener to how both men and women should co-operate and work together to make a better world.

ANJALI THAKUR

OPINION

You know what really gets my bits in bunch?
Ubuntu Unity

For those of you who don't know, "Unity" is the name of the desktop user interface that the popular Linux distribution "Ubuntu" uses. It was initially designed as a user interface for netbooks, with the primary goal being to conserve screen space. Then for a reason that completely escapes me, Canonical decided that it'd be a great idea to slap Unity onto the desktop OS as well, along with it's completely unnecessary and frustrating space saving modifications, and all of the OSX-inspired design features that make me cringe. Unity initially received an overwhelmingly negative response, but Canonical in all their arrogance decided to push through with their little gauntlet of a user interface, and in doing so forced their beloved users to either endure the pain of using Unity, or to abandon ship and seek clearer waters.

The biggest problem that I have with Unity is the aforementioned space-saving design. I'm sure it's absolutely wonderful for netbooks, a breed of computer which is quickly being eradicated in the wake of tablets, but for the rest of the world using computers with a higher resolution than 1024 x 600 it's simply torturous. Trying to use a scrollbar is like taking part in a really unentertaining episode of Tom and Jerry; resizing windows requires the precision and steady hand of an open-heart surgeon; and I still find it off-putting using those poor orphaned menu bars, forever separated from the actual application window that they refer to, banished forever to the top of the screen, hidden completely from view unless a visiting cursor approaches. It makes absolutely no sense to frustrate the user like this, and I can only assume that either laziness or malicious intent was the reason for these netbook-specific features making their way into the desktop version of Ubuntu.

Another little grievance I have with Unity is that they borrowed the over-complicated alt-tabbing scheme that OSX so boldly brought forth into the world. In Unity and OSX, Alt + Tab doesn't switch between windows, it switches between applications; you have to use a separate shortcut, Alt + ~ in order to cycle through an application's windows. I'm sure some of you at this point will have spat your beverage of choice all over this wonderful newsletter, since this hidden and ever so intuitive shortcut has managed to escape you until now - and trust me, you're not alone. From a usability perspective this design decision makes as much sense as having different slots in a vending machine for gold and silver coins. In the traditional alt-tabbing scheme, to switch to an open window you just remember how many other windows you've used before it, then press Alt + Tab that many times - simple, intuitive, revolutionary...

Despite its integral usability flaws, Unity actually does improve usability in one specific area - searchability. There's the Dash, Unity's omni-search box, which is useful despite it's very bulky design. But more interestingly, if you press Alt, a search box so descriptively coined as the "HUD" appears, and allows you to search the menu structure of the currently focused application. Not only is it useful for feature discovery within applications, but it also allows you to keep those happy little fingers on the keyboard while you perform almost any operation you need to. It's arguable as to whether this truly counts as a usability improvement, since the only way to find this feature without someone telling you about it is to accidentally hit Alt and start typing - unfortunately there is absolutely no visual alternative, presumably in aid of that ever so important goal of space-conservation.

I do appreciate that Canonical are devoting time towards improving the user's experience, but it's a real shame to see it go ahead in such a misguided manner. I hope that one day they will put aside their pride, realise their mistakes, and rub some sanity back into their otherwise decent operating system.

LUKE TSEKOURAS

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CSE

Stureps Update

The CSE Student Representatives (Stureps) are the link between CSE Students and the School of CSE. They're current students hoping to improve student life and education within CSE.

To keep you up to date with their happenings we're starting a regular beta column. Of course you can always see our updates on our website (`https://cgi.cse.unsw.edu.au/~stureps/website/wordpress/`) and our facebook page (`https://www.facebook.com/csestureps`).

These past few weeks we've been running our semesterly survey. Our survey aims to find problems/issues with courses before it's too late to change them, and to give the school and lecturers feedback and what's working and what isn't. We also aim to find out ways to improve the labs and the general CSE environment.

We're in the middle of compiling the report for that; check back sometime week 11 for more information on that front.

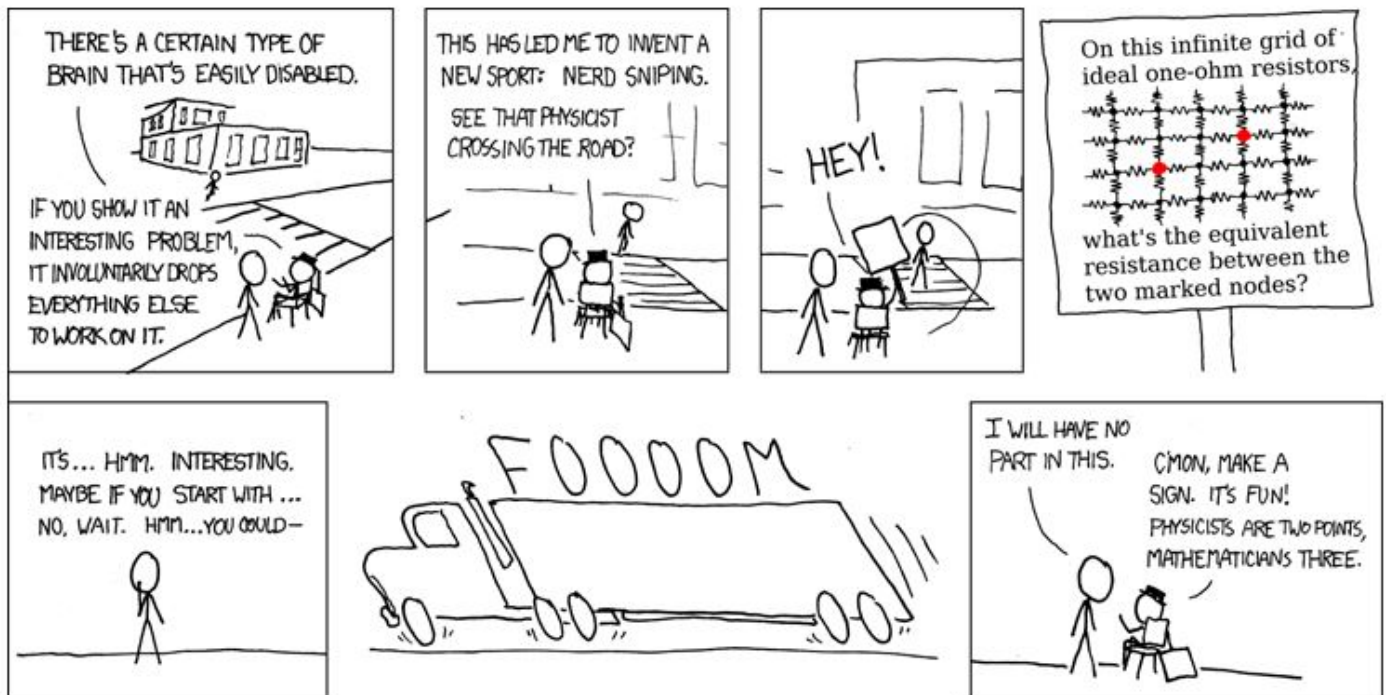And in the mean time, if you have any questions or comments drop us an email (`stureps@cse.unsw.edu.au`), check out the anonymous form on our website, or come and say hello:

- **1st Year:** Lucas Pickup & Oliver Tan
- **2nd Year:** Andrew Semler
- **3rd Year:** Beth Crane & Brad Lorge
- **4th+ Year:** Bec Wiley & Nat Wong

BETH CRANE

ENTERTAINMENT

XKCD Comic 359 - Nerd Sniping

Alt text: I first saw this problem on the Google Labs Aptitude Test. A professor and I filled a blackboard without getting anywhere. Have fun.

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ENTERTAINMENT

Interesting Code - Black Perl

We're trying out a new idea suggested by Nelson Rigby, which is to showcase interesting pieces of code every week. If you come across any pieces of code that you find interesting, why not drop us an email at csesoc.beta.head@cse.unsw.edu.au. Enjoy!

Black Perl is a piece of Perl poetry that was pasted to Usenet on April 1, 1990. The reason it was so famous is because it is parsable by Perl 3. Independent variations have been posted up on the internet to make it parsable for Perl 5. Here is the full text for you to enjoy. What do you think it's output and execution is?

NB: While the poem itself is signed Larry Wall, there is uncertainty with authorship as the original message was posted with forged message headers.

Source: http://en.wikipedia.org/wiki/Black_Perl.

```
BEFOREHAND: close door, each window & exit; wait until time.
    open spellbook, study, read (scan, select, tell us);
write it, print the hex while each watches,
    reverse its length, write again;
    kill spiders, pop them, chop, split, kill them.
        unlink arms, shift, wait & listen (listening, wait),
sort the flock (then, warn the "goats" & kill the "sheep");
    kill them, dump qualms, shift moralities,
    values aside, each one;
        die sheep! die to reverse the system
        you accept (reject, respect);
next step,
    kill the next sacrifice, each sacrifice,
    wait, redo ritual until "all the spirits are pleased";
    do it ("as they say").
do it(*everyone***must***participate***in***forbidden**s*e*x*).
return last victim; package body;
    exit crypt (time, times & "half a time") & close it,
    select (quickly) & warn your next victim;
AFTERWORDS: tell nobody.
    wait, wait until time;
    wait until next year, next decade;
        sleep, sleep, die yourself,
        die at last
# Larry Wall
```

CSE EVENTS & SOCIETIES

www.csesoc.unsw.edu.au/soctail/

2013
CSE SOC
Soctail
Night

THEME:
MOUSTACHES
2 NOV
SAT 7PM

DRESS: COCKTAIL

HOTEL CBD
CLUB BAR
(LEVEL 3)
$40EARLYBIRD
(BEFORE MIDSEM BREAK)

$50AFTER

Google   Microsoft   accenture
High performance. Delivered.

COMPUTER SCIENCE
cse
AND ENGINEERING

Jane Street

ARC
UNSW Student Life

ENTERTAINMENT

Crossword

Once again our resident crossword maker has overdone himself with a massive 21 x 21 crossword. He apologises for the impossible to finish puzzle that he gave you last edition and gives his guarantees that absolutely no clues were left out this time. However he will give no comment on whether this week's crossword is harder than the last one, and with that he wishes all of you good luck.
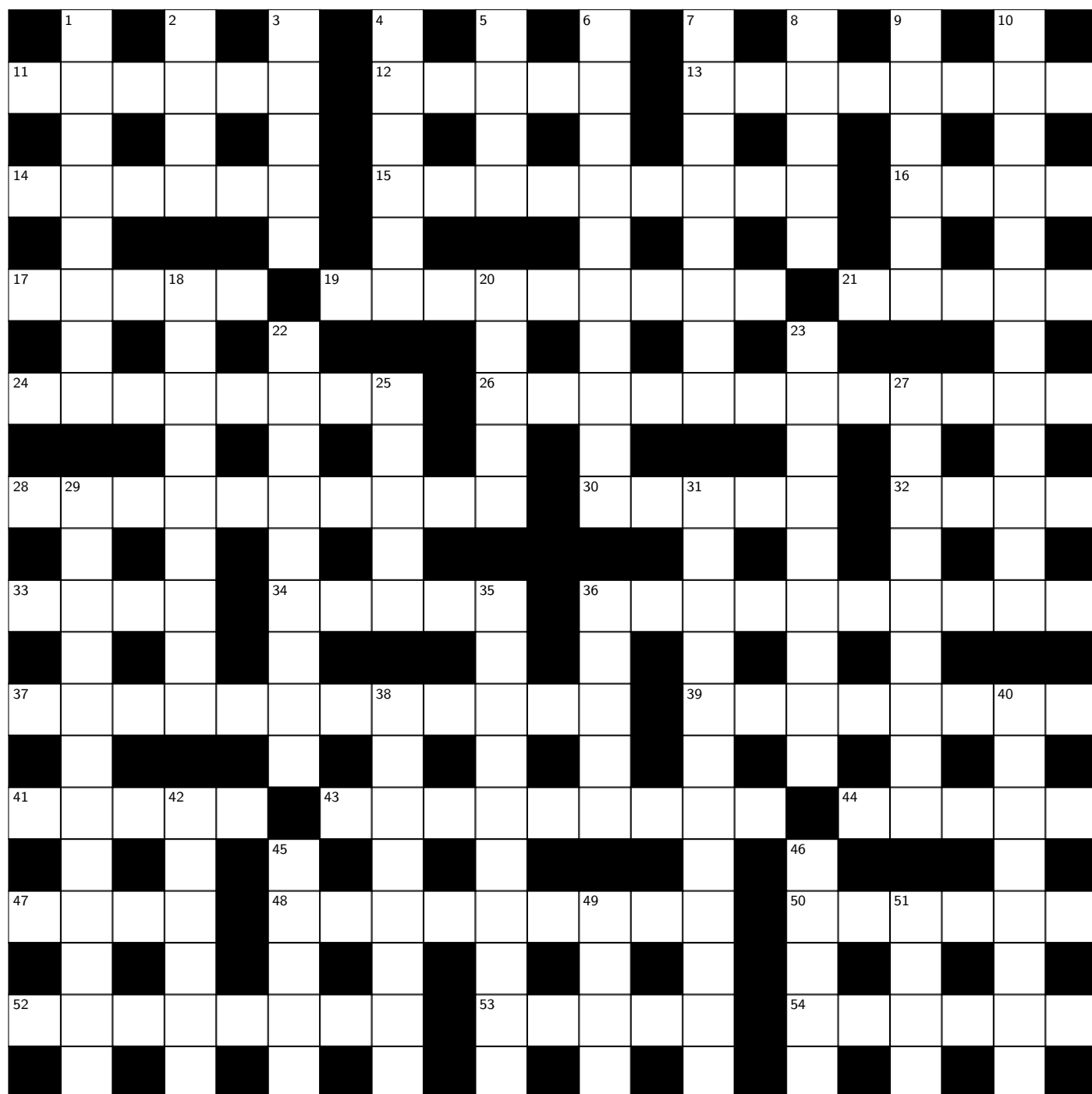
ENTERTAINMENT

Crossword - clues

Across

11. Common Classical form of music
12. Music/Italian - Very
13. Yellowish pigmentation of the skin and eyes
14. Extensions or plug-ins (3-3)
15. Act of reproducing a recording (pl.)
16. Pattern match on wildcard characters
17. Shoes
19. Part of body used to play piano (sgl.)
21. New Zealand singer-songwriter
24. Daughter of Oedipus
26. Stopping on a railway line (5,7)
28. Physically healthy (4-6)
30. Make into law
32. Two matching things
33. Adolescent skin condition
34. Ancient calculation tool (pl.)
36. Music/Italian - Moderately Quickly
37. Famous Metallica song (5,7)
39. Writer of a songs' words
41. Music/Italian - With feeling, "Con ???"
43. Music played during a title sequence (5,4)
44. Piece of writing
47. Connected strands
48. Extremely humorous
50. Exceeding what is normal
52. Singer of "Hero" (sur.)
53. Relating to birds
54. All members of 'The Ramones' adopted this surname

Down

1. Writer of "Like a Rolling Stone" (3,5)
2. Device used on the neck of guitars
3. Low pitched singer
4. Capital city of the Republic of China
5. World's largest continent
6. Singer/Writer of "Suit and Tie" (sur.)
7. Removal
8. Music - Subdivision of a beat
9. Music/Italian - Slowly
10. Player of an accordion
18. Queen of legendary King Arthur
20. Protected by gates
22. Polish dance
23. City home to The Porsche Museum
25. Celadon City Gym Leader
27. Variant of twopence (pl.)
29. Popular western breakfast food (5,3,4)
31. Famous Scottish folk song (4,4,4)
35. In memory of (2,8)
36. Parent's sister (pl.)
38. Philosophy of negation
40. Metaphor - Final effort (4,4)
42. Romantic Era Austrian composer (sur.)
45. Group of singers
46. Measure of length
49. Leave out
51. Music/Jazz - Accompany (abb.)

OSWYN BRENT

Last week's solution:

	M	A	T	R	I	C	E	S		A	C	E	T	I	C	A	C	I	D	
E		L		N		O		A		R		L		S		N		T		P
M	A	G	M	A		P	E	D	I	G	R	E	E	S		A	S	C	I	I
P		A		L		D		O		C		U		E		H			C
I	N	E	R	T	I	A		L	E	N	G	T	H	E	N	S		Y	A	K
R			R		N		E			R				T					A
I	G	L	O	O		A	E	S	O	P		O	O	H		H	E	L	I	X
C		O		P		R			R		M		E		E		A		E
I	N	S	T	I	L		M	A	X	I	M	A		L	U	S	T	R	E	S
S		T		C			L		M		G		I		I		V	
M	I	C	R	O	S	C	O	P	E		A	N	N	O	D	O	M	I	N	I
		A		F		O		H		E		E			L		C		M
P	O	U	N	C	E	D		A	B	B	O	T	T		S	O	D	I	U	M
O		S		A		E		C		O		K		G		D		A
S	L	E	E	P		S	E	E		N	Y	L	O	N		I	N	E	P	T
T			R		N			A		A		E				U
C	O	G		I	N	E	R	T	N	E	S	S		P	O	S	T	W	A	R
A		A		X		A		N		A		S			O		I
R	O	M	E	O		A	Q	U	A	R	E	G	I	A		C	O	M	E	T
D		U		R		R		O		N		C		E		A		Y
	S	T	A	N	D	S	T	I	L	L		A	L	K	A	L	I	N	E	

CSE EVENTS & SOCIETIES

Upcoming Events

CSESoc Weekly BBQ
Every Tuesday, 11.30am - 12.30pm
Physics Lawn
CSESoc's Weekly BBQ is back again!

CSESoctail Night
Saturday, November 2nd, 7pm - late
Hotel CBD, Club Bar
Cost: $50
You are cordially invited to CSESoc's end of year cocktail party. Please attend with your most dapper mo.

Purchase tickets at `www.csesoc.unsw.edu.au/soctail/`

EVELYN CHENSEN

News in Brief

If you can't decide, just shut down your government
It's been 7 days since the American government shutdown as politicians failed to come to an agreement about the new budget when the financial year ended. Turns out that being President means that you can't just simply distribute money to the masses; there's always that one party who will be firmly opposed to taking care of the people. All non-essential personnel were suddenly told they were on unpaid leave indefinitely while the higher ups battle it out over whether Obamacare is affordable. That's okay though, the people should be used to government shutdowns considering that this has happened 17 times before. The most important thing for us is that the US dollar is likely to go down if they fail to reach a decision soon, so prepare your credit cards and get ready for lots of online shopping.

Dying for sex: it's really a male thing
Some male marsupials have been known to die after the mating season, and Australian scientists believe that they have discovered the reason behind this extreme. In a bid to out-compete each other to father offspring, the long mating sessions of up to 12 hours have been proven to have a detrimental effect on the immune system of the male marsupials, with high stress and testosterone levels causing massive breakdown in body tissue. You can't really blame just the males when the females have been known to be equally promiscuous with their mating habits in order to promote sperm competition. At the very least the males marsupials can die knowing their superior genes have been passed on.

Parasite got your Tongue?
The tongue biter, a crustacean related to crabs and fish is a kind of parasite that bites well, fish tongues. This bizarre parasite not only latches on to the tongue of the fish and sucks its blood, it does it until the tongue falls off and it becomes a replacement tongue. If you think that's weird, wait until you get a load of this - the parasite is male until it latches onto a tongue, whereupon it changes sex. While there are many cases of juvenile males killing off fish population, a female parasite can last on a fish's tongue for years. It's a good thing that fish can't talk, or enunciation would probably be hard.

Always Remain Skeptical when the Figures are on Paper
A leaked copy of the NBN co's latest three plan have shown that the cost of connecting each home and business to the fibre-optic network has dropped to less than $2500. However Communications Minister Malcolm Turnbull said that he does not believe in the figures of the report and is waiting on the outcome of a strategic review that he ordered on Tuesday. While Malcolm confirmed this week that the fibre-to-home connections already under construction would be completed, the new government would wait for the outcomes of the strategic review before deciding whether to proceed with the rest of the fibre network rollout. Perhaps the government is finally running out of reasons to delay giving us our internet.

iPhone? You mean iSatellite.
A new gadget that is able to turn iPhones into satellite phones mean that people who work in remote places can now enjoy all the benefits of an iPhone while still actually be able to keep in contact with others. The decive is basically a sleeve that is equiped with a satellite SIM card and antenna that can be used anywhere within the Thuraya satellite footprint. The SatSleeve (as it is called) attaches to the iPhone 4 or 4s, so users wanting to upgrade to an iPhone 5 may have to wait for further models of the SatSleeve. At $690, it is admittedly cheaper than your standard satellite phone - the device however does not come shipped with an iPhone already in place. Data will even become available at approximately $8 a megabyte, so you can play Candy Crush with your friends even as you are lost in the woods.

THE BETA TEAM

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