

NEWS FROM COMPUTER SCIENCE AND ENGINEERING

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BETA

Free as in speech and our awesome BBQs.

Beta Issue #92
Delta Edition
Week 7 Session 1, 2014

FEATURED, TECHNOLOGY

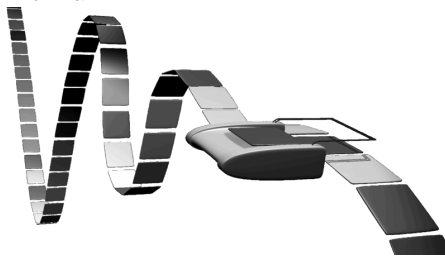
Weird Computing II Crazy-Random-Happenstance¹

Welcome back to the strange land of Weird Computing. For those new to this sporadic tour, we are traversing some of the more bizarre ways people have come up with to make nature do maths for us. Please be mindful of the locals - the lost scientists who sit somewhere between computer engineer and certified crackpot.

For our second foray into the dark and unexplored jungle of computer implementations, we're going to be attempting to befriend a group of geneticists gone rogue, learning about the computational theory behind non-determinism, looking at the hidden computing power of DNA, and meeting one of the kings of post-cyberpunk Sci-Fi. Sound good? Let's get started!

First, a little revision. A Turing Machine is a hypothetical computer, which possesses an infinitely long tape full of bits, and a head which moves along the tape. The head can read the bit under it, and decides what to do next based on a big set of rules. It can do things like move left and right, and write a 1 or a 0 to the tape. Turing proved that this machine is capable of performing any computation possible, and that's why we like him. You should note, however, that a Turing Machine would be Mind-Numbingly Slow, so we only use them as a hypothetical.

Now, you have probably all heard about P and NP before; these refer to the 'difficulty' or scaling factor of computational algorithms for solving a certain problem. A problem is in P if there is a deterministic algorithm that solves it, which scales like a polynomial of the input. NP stands for Nondeterministic Polynomial. (Not Non-Polynomial. Pick up your game.) This means you need a non-deterministic algorithm to solve this problem in polynomial time, and that a deterministic algorithm must be superpolynomial.



So what's the difference? A Deterministic Turing Machine is only allowed one rule per input - if the head is in position 4 and reads a 1, its rules table must specify only one action for it to perform next, say go left. A Non-deterministic Turing Machine (NTM) laughs at this silly limitation, and is quite happy to have two contradictory instructions for the same situation. This means that the machine should continue down two different paths, getting into two different situations, and doing two completely different

computations in parallel. For a Non-deterministic Turing Machine, if any of the paths lead to success, the whole machine is deemed to have succeeded.

There are two ways of thinking about this: 1) that a NTM always and magically picks the best option which will lead to the result earliest, or 2) that every time there is a duplicate rule, the machine clones itself and the two machines go off doing different computations, and we only care about whichever one finished first. Clearly neither of these hypotheticals can actually exist. This is why NP problems are not our friends. But you should also be able to see that, if we *did* have one of these things, it would be really kinda helpful - you can get a lot done if you're guaranteed to have the shortest path through a big branching system of possible solutions. (Hell, we could solve NP problems in polynomial time.)

Now, leave non-determinism on the backburner while we do some biology. (Yes I know, but it gets cool later.) So, organisms are made of cells. Cells have a nucleus. Inside the nucleus there are chromosomes. Chromosomes are made of DNA. We just covered about three

¹ If you didn't get this, google Dr Horrible's Sing Along Blog immediately

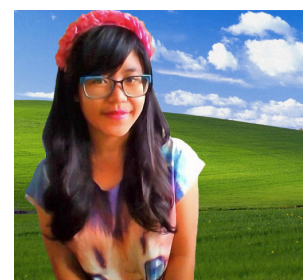
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NEWS

Heartbleed

11/10 on the security vulnerability scale

OpenSSL is an open source cryptography software used by websites such as Google, Facebook, and Instagram to keep data safe by implementing HTTPS encryption. An estimated two-thirds of the Internet's Web servers use OpenSSL. The Heartbleed bug is a vulnerability in OpenSSL, that allowed attackers to get passwords, encryption keys and other sensitive data. The bug is in the OpenSSL's implementation of the Transport Layer Security (TLS) Heartbeat Extension. The heartbeat protocol ensures that communications between user and the site are kept alive even when the line goes quiet. When it is exploited, the attacker can read the memory contents of the SSL server without leaving any trace. Not all websites using OpenSSL were affected, as some were using older versions and others had not enabled the "heartbeat" feature.

This is one of the most serious security flaws discovered recently. Codenominon and Google researcher Neel Mehra both found the bug independently from each other, but on the same day. We don't know if it was exploited but it is possible that your data could have been captured by criminals or intelli-

gence agencies, such as the NSA. As a consumer, you should check if the websites you use have patched their code and then change your passwords. As a developer, you should update your version of OpenSSL. A new fixed version has been released. OpenSSL 1.0.1g, released on 7th of April 2014, fixes the bug. You should reissue and reinstall SSL certificates and ask customers to change their passwords.



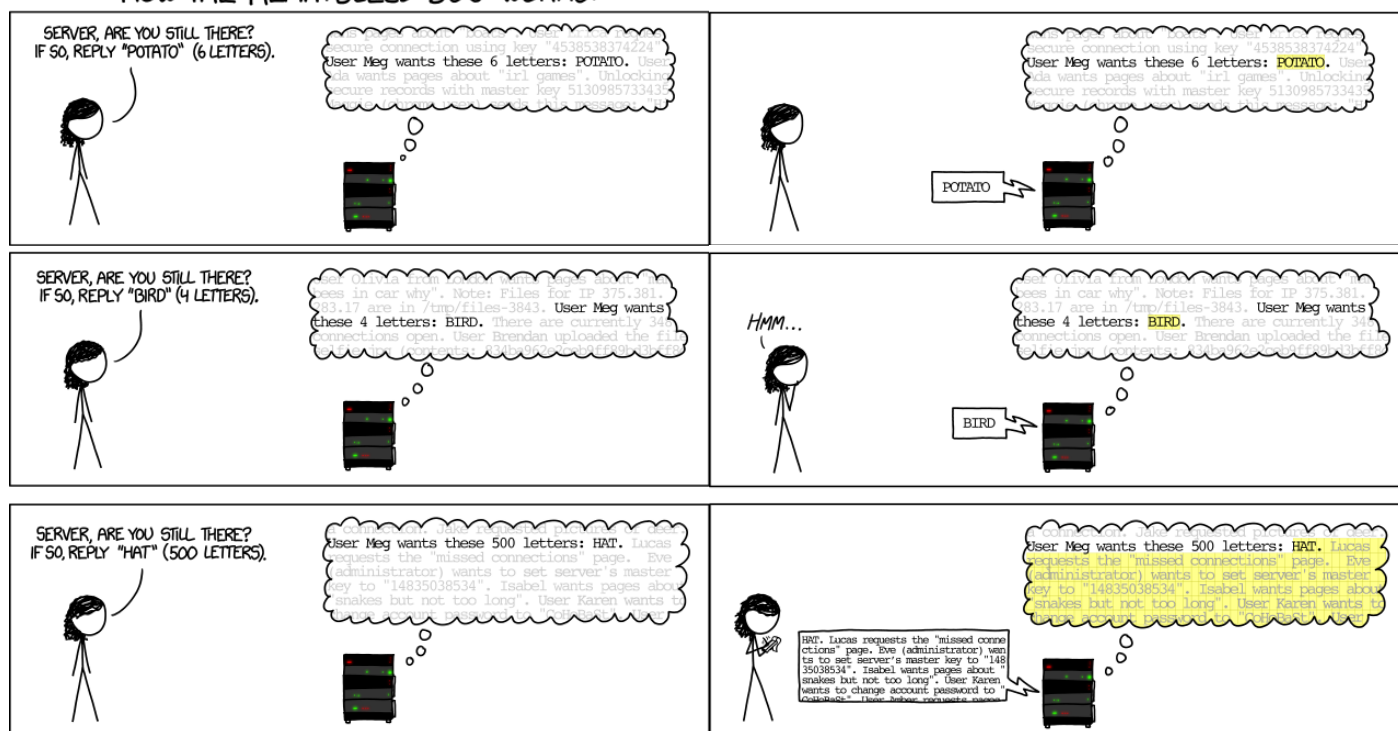
Companies have been rushing to patch vulnerable code. cnet.com is tracking which of the top 100 US sites have patched the Heartbleed bug. Microsoft confirmed that Microsoft and MSN were not vulnerable, as they were not running OpenSSL. Google, and Facebook have patched the vulnerability.

The bug was introduced to OpenSSL in December 2011 and was in the OpenSSL release 1.0.1 on 14th of March 2012. The error was unfortunately introduced by Dr Seggelmann, of Münster in Germany but the error wasn't detected by him or by the reviewer. He missed validating a variable containing a length. The payload length is never actually checked against the size of the payload. Therefore, it reads arbitrary data beyond the storage location of the request if you send a payload length (up to 64K) and an undersized payload.

He claims that it was not inserted maliciously. "It was a simple programming error in a new feature, which unfortunately occurred in a security relevant area", he said. The main reason this wasn't discovered earlier is that OpenSSL is an open source project which only a few people contribute to. Large companies use it without doing anything to contribute to the project. If the users of OpenSSL contributed to checking the code, then this problem could have been detected much earlier.

SAVINKA WIJEYRATNE

HOW THE HEARTBLEED BUG WORKS:



Weird Computing II - contd

centuries of cellular biology. It should be apparent to you, by virtue of living in the 21st century, that DNA encodes information. That information describes the full automatic program of all your cells, their arrangement into macroscopic structures like tissues, the arrangement of those tissues into organs, and organs into the bag of semi-supported slush that is your body. That's **a lot** of information. It should be pretty clear that, in executing this self-assembling construct from DNA code, the cells need to do computational work on the information encoded in the DNA. But cells aren't smart – they don't get things done elegantly nor perfectly. They evolved these mechanisms through natural selection, so you can be fairly sure they involve the laws of physics and some brute force.

So how does computation get done, and how can the cell guarantee it doesn't get stuffed up? Well actually, it works a lot like compiling a program to run, except with a special twist at the end. DNA natively encodes a quaternary number system; it has 4 base pairs. Three DNA base pairs make a codon. Most codons encode directly a certain amino acid (and there are some that work kinda like DNA-control-string-thingos), so it's kind of like assembly code. The process by which this information is accessed is called DNA transcription. In this process, another kind of strand comes along, called mRNA, which copies a chunk of DNA out, codon by codon, based on those control-string-thingos I mentioned. This 'chunk' is a series of codons for amino acids, which collectively represent a protein. Copying the right chunks into mRNA is kinda like assembling our instructions into op-codes. The mRNA floats off to another part of the cell, called the ribosome, where the protein it encodes for is actually built, which is kinda like executing that step of the program. The mRNA then typically goes back and copies more DNA segments for building. But that is where the similarities stop: in computing, we've finished our work in executing the operation, but in the cell, all we've managed to do is make a whole bunch of proteins, which are now floating around. And bump-

ing into each other. And reacting with each other.

Proteins and other created molecules in the cells react based on the laws of chemistry, but the process isn't easily describable, particularly when they're bumping around in cell goop. There are usually many different possible reactions, and which one occurs to a particular molecule is based on the random chance of what it bumps into first, or is non-deterministic (ringin' any bells?). Your cell usually wants a particular result, so its solution is to create a buttload² of the protein, so that enough of them end up the way we actually want them too. The remaining molecules will have undergone chemical reactions and ended up as a variety of other unwanted products, so we can simply remove these, break them apart and recycle the bits.



So what if we made a computer that does the same thing? This is called molecular computing, or DNA computing. The process is basically the same – fill a test tube or similar volume with lots and lots of carefully selected proteins and allow them to react non-deterministically. The fact that there are millions of individual molecules is what replicated the cloning stunt of the NTM, and virtually guaranteed that the goop contains the correct 'answer' in the form of a particular combination of protein bits chained together. Unfortunately, it's mixed in with all the possible wrong answers, so we'll need a way to remove these. So once the calculation is done, we can carefully add other chemicals, like strong acids, which will break down the non-solutions into their component parts. "But Matthew" a wise reader may question, "won't this acid destroy the right answer as well?" ... yeah, it usually does...

Understandably, it is this last step which is actually really hard to imple-

ment – that's basically why we don't *have* DNA computers. As with a hypothetical NTM, even if you allow it to follow the full number of paths, you are forced to check through all the paths to separate the non-solutions from the accepting conditions. The difficulty with this is actually pretty insurmountable – people consider quantum computers much more likely to succeed than molecular, so that should give you an idea of exactly how hard it really is.

Still, as quantum chemistry becomes better and better understood, and with the non-deterministic power of molecular computing so obvious in our own physiology, the technology is well within the reach of suspension of disbelief. And that makes it very fair game for Sci-Fi. By the 90s, the cyberpunk genre had run its course, and was slowly subsiding, while a plethora of subgenres grew from its fertile grounds, the best known of which is Steampunk. Neal Stephenson was one of the great authors working in this changeover period, having built a firm reputation in building fiction combining some of the most challenging ideas from the nature of consciousness and programmability into his novels. In 95, Stephenson provided one such subgenre, Nanopunk, with one of its crown jewels: *The Diamond Age, or A Young Lady's Illustrated Primer*. In Stephenson's world (No spoilers dw), molecular-scale deterministic computing reigns supreme, but one particularly creepy form of non-deterministic computing, involving little computing units transmitted between humans like an STI, ends up being one of the best MacGuffins of all time. Definitely worth a read, as are all of Stephenson's works.

That's all for this week's sojourn. Tune in next time for even more biology (yay!), as we have a look at the more obviously successful biological computer, the brain! We'll be learning about some philosophy, taking a crash course in neuroscience, and going back a bit further into the birth of Cyberpunk itself. (Duhn, duhn, Duuuuunn).

² Not actually a buttload; a Butt is a medieval unit meaning around 445 litres of wine

News In Brief

Anzac appeal to sell pre-recorded minute of silence

The Minute of Silence is a pre-recorded 60 seconds of silence, and available for sale as a fundraiser for this year's Anzac Appeal. The track was recorded by more than 80 current and former members of the Australian Defence Force and their families, serving in conflicts including Afghanistan, Iraq, Korea, and Vietnam. President of the Returned and Services League WA branch, Graham Edwards, says with an ageing membership it's much harder to get veterans out on the streets fundraising in the traditional way.

Vibrator found in fish's stomach

A Norwegian fisherman was given a rude shock after finding a large, orange vibrator in the stomach of the fish he was gutting. Bjorn Frilund caught the

5kg cod whilst fishing in the waters of Eidsbygda in western Norway. As he began to cut into the fish he found two semi-digested herrings, but as he dug deeper he discovered a large orange vibrator. "I was astonished, It was totally unexpected. I had never seen anything like this before."

Crufts winning Chihuahua stolen in England

Police are searching for thieves who broke into a house in northern England and stole five chihuahuas, including the "best puppy in breed" champion at this year's Crufts competition. Valenchino Chihuahua Xena was snatched along with four other dogs on Thursday. It is estimated that between them they are worth tens of thousands of pounds, although owner Mal Hilton said he was more con-

cerned that they would come to harm.

Man defies gravity by running upside down in a 360-degree loop

Damien Walters has become the man to run completely upside down through a 360 degree loop. "I saw it done by people on skateboards and BMXs so thought I would give it a try... [The loop] looked a lot bigger than I thought it was going to be"

Google Glass on sale for one day

Google has a limited supply of its eye-wear available to the US public tomorrow. The device will cost \$1500 and users must be over 18. Google has reportedly sold 8,000 devices last year as part of their Explorer program.

DYLAN KELLY

TECHNOLOGY, NEWS

Sublime Text and its new competition: Atom

Will the underdog take the reigns?

While there has always been rivalry over which text editor is the best, there is but one that reigns supreme. Sublime Text is a "sophisticated text editor for code, markup and prose", that comes with a sleek user interface and is customisable with thousands of settings. It was first created in early 2008, and has slowly progressed into one of the best text editors known to man: an easy to use contender in the Vim vs Emacs war. It's written in Python and C++, works on all three major operating systems, and even has a portable Linux version that will run on CSE machines.



But is there another contender that will soon drop into the competition? Would an article ask such a question if there wasn't an answer? On February 24th, Github, the revision control host that we all know and love, released a new text editor: Atom. Atom is written primarily in Node.js, runs using WebKit, and as expected provides

embedded Git control. Whilst Atom is still in beta, it is OS X only, however Windows and Linux binaries are on the roadmap. The core is currently closed source, and it is unclear how it will be licensed once it leaves beta.

Atom features an similar looking interface which features design elements from Sublime, along with its own flare. In contrast to Sublime, because of the way that Atom is written on top of WebKit, it allows a massive amount of customisation. Where the Sublime API restricts what can be changed, and is difficult to use without crashing the program, it appears that the Atom API will allow customisation of almost any UI element within the software.

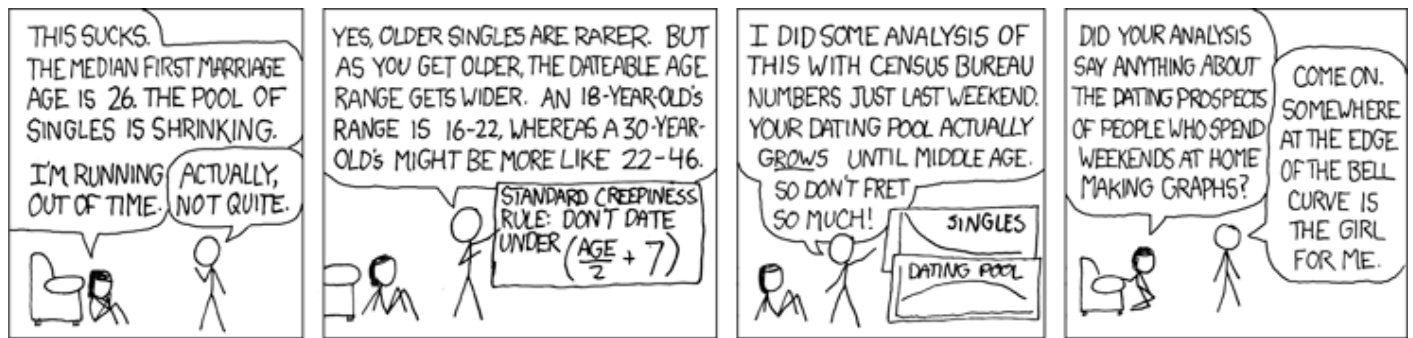
As far as pricing goes, both editors are currently "free to use". Sublime is shareware, whilst a hefty fee of \$70 disables the small popup that appears every couple of times you save, the software is free to evaluate indefinitely.

Atom is in public beta, which means you have to wait for an invite, or be sent one by someone already using it - each user is given 3 invites.

Where Atom triumphs over Sublime Text is integration of packages. Sublime Text uses a package manager aptly named Package Control, which requires you to go through a console-like system to download and install modules and themes. Atom on the other hand, has a GUI, which simplifies installation. Whilst Atom doesn't yet have the same coverage of plugin types, I think that it will continue to grow, and by the time it leaves beta will match that of Sublime.

So what is the verdict? Atom still has a way to go before it comes close to the Glorious Leader of the Text Editors, Sublime Text. With larger package coverage, and better documentation, we may see the underdog take the reigns.

JOHN WISEHEART



FICTION

When Seduction Gets Technical

A realistic day at the bar

Rick eyed the girl in front of him uncertainly. He had exhausted his supply of token smalltalk topics. To fill the void, he began some tentative, ambient beatboxing. That should give him a good few seconds to weigh up his options. Option 1: segue into something funny and then go for a number. Option 2: let the ambient beatboxing degenerate into awkward silence and run away.

The girl's brow grew furrowed. Option 2 time. "Anyway, gotta go. Enjoy", Rick grunted, severing eye contact and hurrying past. Enjoy?... Enjoy what? She wasn't doing anything in particular afterwards. He felt like a numpity.

Far above, in a place outside of space and time, a pair of eyes surveyed the scene with sympathy. These particular eyes belonged to an androgynous being called Abia. Abia happened to be a supreme being. (S)he stroked her/his flowing silver beard, which was purpose-materialised for stroking. Coming to a decision, (s)he gestured lazily, and a seam opened up in space-time.

Rick felt a sudden intelligence inhabit his mind and body. Given omnipotent beings are generally not consid-

ered scientifically probable, Rick felt surprisingly accepting of this foreign presence. Possibly, he was lulled by its benevolence. A great but gentle force gripped Rick's body, sucking him through the fabric of his reality and dumping him into another.

The bar was smokey and lit by a dim orange glow. Trashy club music ran in the background. The place smelt like hedonism and Rick liked it. He felt different recently, almost like something fundamental in his biology had shifted. Like his value proposition -- as a person -- had suddenly doubled.

He moved purposefully to the bar, sat down, and ordered a rum and coke. Turning to the girl next to him, he flashed a disarming smile. "Hey, I'm Rick".

She eyed him, disinterested. "Sarah."

"If I wanted to find occurrences of your name in a string of HTML, I could do so in subquadratic time using a finite-state automaton based search." Her face lit up. The old FSM-based-string-search line, works everytime.

"That's amazing. But you'd have to

compare each character of my name with each character in the HTML string wouldn't you?" Rick smiled knowingly.

"Nah, you can construct a deterministic finite automaton from the search string -- your name. Feeding the HTML string to this DFA is quick. $O(n)$. The work is pushed out to the preprocessing, the DFA construction."

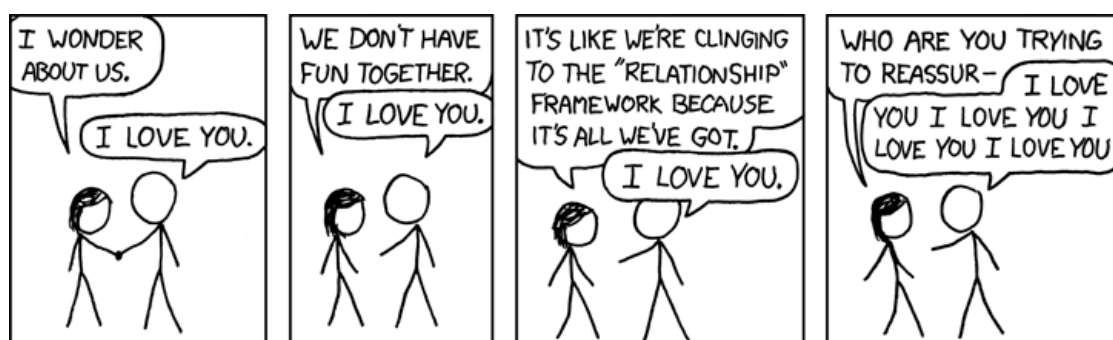
Sarah was starting to look very interested in him. She wasn't alone. Several nearby women were sending him keen glances. In fact, one was now ignoring her boyfriend, and was instead staring longingly at Rick.

Rick took a sip of his rum and coke.

"Had a mate who tried to naively do it in big $O((\text{HTML_string_size} - \text{string_size} + 1) * \text{string_size})$. I was like big Oh... more like big Noh buddy!"

That was the golden line. Sarah promptly dragged him out of the bar. This is what happens when you study computer science, thought Rick happily.

NELSON RIGBY



UNIVERSITY

Meet the Stureps

Introducing your StuReps - the voice for you at CSE! We are responsible for making sure CSE life is running as smoothly as it can, and we directly liaise with the school if anything escalates to us.

One of the most important things we do is compile a report mid-way through the semester to let the school and lecturers know how they're doing. You can check our website for the reports from previous years. This semester, we need you to give your feedback! You can do so by:

- Doing a survey about CSE in general here: <http://bit.ly/sturep14s1>
- Lazy? Do a survey for a particular course here: <http://bit.ly/sturep14s1c>

One lucky survey participant gets a prize!

You can contact us anytime by emailing stureps@cse.unsw.edu.au, or through our website: <https://www.cse.unsw.edu.au/~stureps/>.

Octavia

octavias@cse.unsw.edu.au

Octavia is one of the shortest people you'll ever see... or literally run into (whichever happens first). She's a first year student rep who's there to help, make bad jokes and eat free food. Feel free to stop her for a chat. Oh and not to forget, R.I.P. Windows XP



Harry

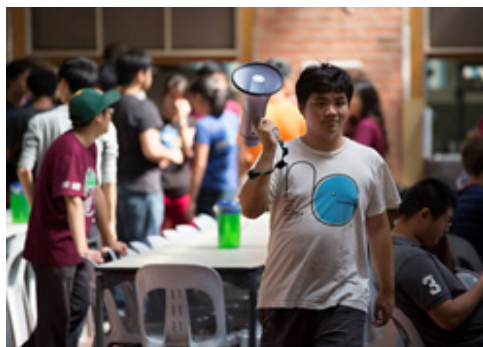
harryd@cse.unsw.edu.au

Harry is a first year computer science student. He lives on campus so is very available to talk and help out. He is involved in far too many clubs at UNSW and has participated in events run by Robogals, CSESoc, CSE Revue and BlueSat, among others. He is keen to get involved in uni life and help other students do the same. He taught himself Java in primary school and has always been interested in computing. When he's not at uni or programming, Harry spends his time canyoning and abseiling. You may even see him dress up like a Lord of the Rings Character from time to time.

John

jcaw@cse.unsw.edu.au

John is a 2nd year Comp Sci student who spends his spare time eating, sleeping, working, and most importantly taking feedback as a sturep. You can find him in the socs office in K17, or somewhere else on campus, probably.



Oliver

otan@cse.unsw.edu.au

Oliver is a master of disaster recovery and loudspeaker systems. He is a second year student representative who looks to improve CSE by speaking on your behalf. Contact him anytime!

UNIVERSITY

Meet the Stureps - contd

Omair*omaira@cse.unsw.edu.au*

Omair is a third year computer science student who is an active member of CSESoc and Game Dev Soc. You can usually catch him hanging around the Soc's Office or in the K17 Labs. Don't hesitate to let him know about how you think things in CSE could be improved!

**Matt***mmcewen@cse.unsw.edu.au*

Matt is a third year Computer Engineering/Physicist who, unlike Computer Scientists, does a real science. On top of that, he also does real engineering, unlike all those Software Engineers. He loves being active in CSESoc and Revue, and is a very approachable person, even though he lifts heavy things and is massive, so feel free to intercept him between lectures for flirtatious, yet platonic, conversation.

Sarah*sarahb@cse.unsw.edu.au*

Sarah is a fourth year compsci student, who hasn't quite mastered the art of graduating yet. She spends her spare time tutoring first year courses, and can be seen drinking soylent from her trusty thermos (it's not made of people!). Feel free to contact her with any problems you're having.

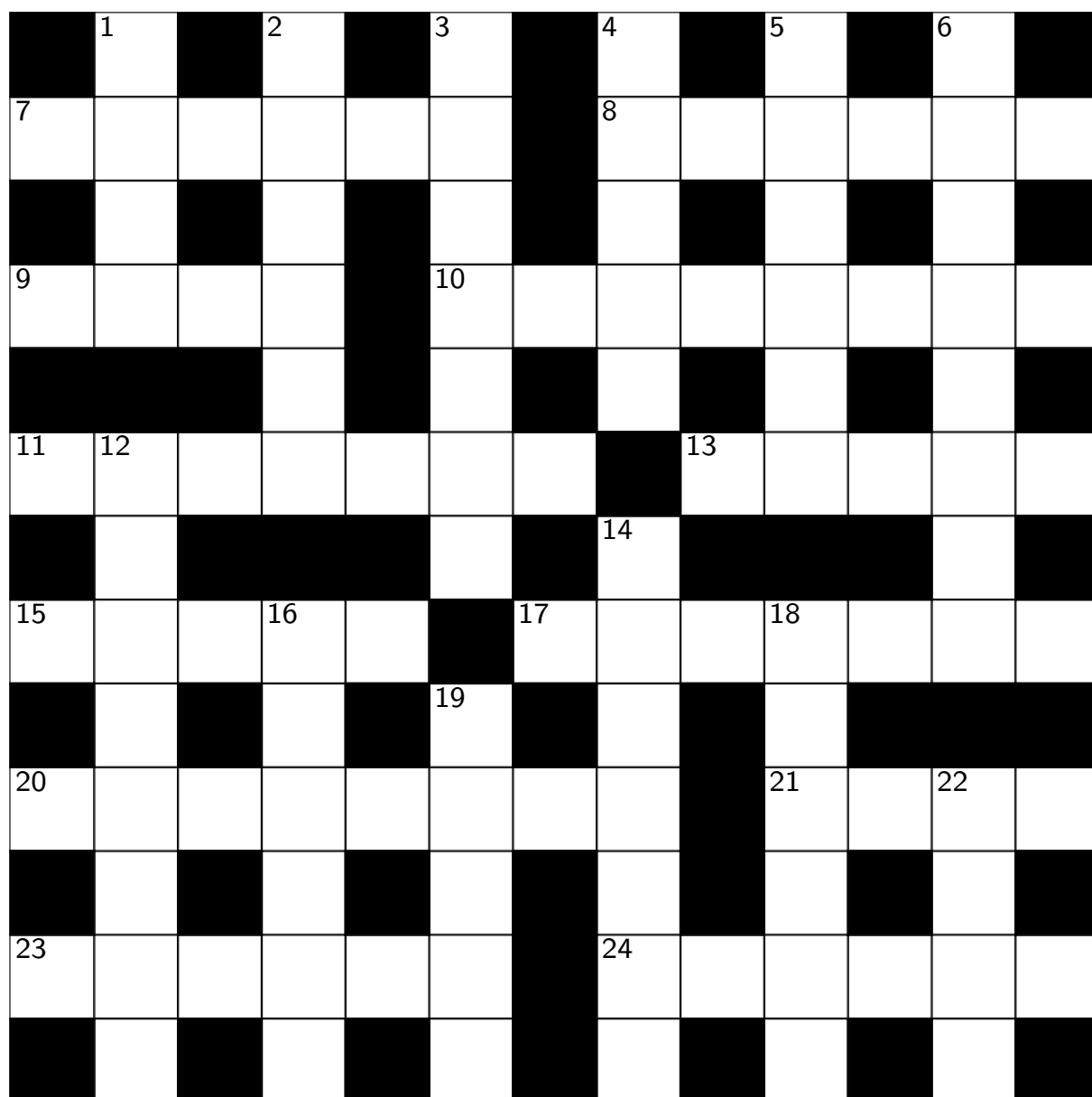
**Chris***cmanou@cse.unsw.edu.au*

Chris is a fourth year software engineering student, who, for some reason also decided to do physics as well. In his spare time he makes things and codes. If you want to give feedback you can find him in the socs office in K17, or in a physics lecture.

CSE STUDENT REPRESENTATIVES

ENTERTAINMENT

Crossword



Across

7. Late Baroque
 8. Common web server/Native American tribe
 9. First element of a list
 10. Actual time, as opposed to CPU time (4,4)
 11. Memory location
 13. Flat cover
 15. LIFO data structure
 17. Wood particles
 20. Complete, total
 21. Representative symbol
 23. Valuable things
 24. Smart

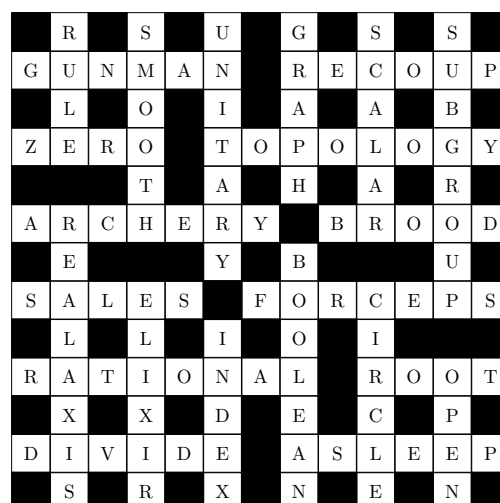
Down

1. Element of a network
 2. File container
 3. Shorter than a high rise (3,4)
 4. Man made water channel
 5. Repeated sound in meditation
 6. Enclosed spaces
 12. Structured stored data
 14. Response time
 16. Irish symbol
 18. Hardware controller
 19. Visitor
 22. Follow command

Don't forget to submit your solutions to
beta.puzzles@cse.unsw.edu.au

OSWYN BRENT

Last crossword:



ENTERTAINMENT

Just for lols

A compilation of computing jokes and idioms

A computer lets you make more mistakes faster than any invention in human history – with the possible exceptions of handguns and tequila.

If it weren't for C, we'd all be programming in BASI and OBOL.

There are 10 types of people in the world: those who understand binary, and those who don't.

In a world without fences and walls, who needs Gates and Windows?

Programming today is a race between software engineers striving to build bigger and better idiot-proof programs, and the Universe trying to produce bigger and better idiots. So far, the Universe is winning.

Computers make very fast, very accurate mistakes.

Never underestimate the bandwidth of a station wagon full of tapes hurling down the highway.

An SQL statement walks into a bar and sees two tables. It approaches, and asks "may I join you?"

Q: Why is it that programmers always confuse Halloween with Christmas?

A: Because 31 OCT = 25 DEC.

Man is the best computer we can put aboard a spacecraft... and the only one that can be mass produced with unskilled

labor

Q: How many programmers does it take to change a light bulb?

A: None. It's a hardware problem.

Two strings walk into a bar and sit down. The bartender says, "So what'll it be?"

The first string says, "I think I'll have a beer quag fulk boorg jdk^CjfdLk jk3s d#f67howe%^U r89nv~owmc63^Dz x.xvcu"

"Please excuse my friend," the second string says. "He isn't null-terminated."

"I'm not interrupting you, I'm putting our conversation in full-duplex mode."

- Antone Roundy

A doctor, a civil engineer and a programmer are discussing whose profession is the oldest.

"Surely medicine is the oldest profession," says the doctor.

"God took a rib from Adam and created Eve and if this isn't medicine I'll be..."

The civil engineer breaks in:

"But before that He created the heavens and the earth from chaos. Now that's civil engineering to me."

The programmer thinks a bit and then says:

"And who do you think created chaos?"

CSESOC BETA TEAM

ENTERTAINMENT

Riddles

1. Picture, if you will, the Isle of Row, a one-acre forsaken swatch of desert in the middle of the Sea of Troubles. Despite its diminutive size, Row has no less than four kinds of people, all outwardly indistinguishable from one another. There are the members of the First Family, who always tell the truth, and the Pretenders, who never do. There are the Eccentrics, who may or may not tell the truth, depending on whim. Finally there are the Wimps, who are incapable of speaking unless they have heard one of the other kinds of people speak, and then they obsequiously chime in.

You find yourself at the only crossroads on the island, facing four possible routes. Three Rowians stood by, milling about, and you have only two questions to ask in order to reach, as directly as possible, the fabled 100-foot Tower of Schmooze, the island's premier, albeit only, tourist attraction. What should you do?

2. A jail consists of 100 cells in a line, all starting out closed. The warden gets drunk one night and goes along

opening every single cell. He then returns to the beginning, and "toggles" every second cell -- in this case, they're all open, so he closes every other cell door. He then runs to the beginning again, and "toggles" every third cell, then again with every fourth cell, and so on until the very last run in which he only toggles the hundredth cell, then drops down from exhaustion.

How many cells are left open after this process?

3. There are 100 coins scattered in a dark room. 90 have heads facing up and 10 have tails up. You cannot distinguish (by feel, etc.) which coins are which. How do you sort the coins into two piles that contain the same number of tails?

Don't forget to submit your solutions to:

beta.puzzles@cse.unsw.edu.au

CSESOC BETA TEAM

CSE EVENTS AND SOCIETIES

Upcoming Events

Rock Climbing

Wednesday 23 April 11am

Sydney Indoor Climbing Gym, St Peters

Cost: \$15

Climbing rocks is one of the most useful pastimes. Imagine yourself just strolling along when suddenly your path is blocked by a large rock wall riddled with conveniently placed rocks shaped perfectly to fit your hand. Normal folk just have to sadly sigh and turn around canceling their plans for the day. BUT you will find most of your CSE brethren would scoff at such a futile attempt at inconvenience and scale the face with great vigor and agility.

YOU as well can learn this great skill. CSESoc is holding the first of their bi-annual Rock Climbing sessions. Attending this event can provide you with the skill and know how needed to stare at giant walls of rock and laugh at their inferiority instead of pining at the thought of their impossibility.

Deloitte Technology Insight Night

Monday 19 May 5:30 - 7:30pm

Level 9, 225 George Street Sydney

RSVP: to Jemma Renshaw; jrenshaw@deloitte.com.au.

Essential for students to attend.

RSVPs should include full name, contact phone number and email. In addition to this information, you should include your degree type, university and student status (local student or international student). Places will be strictly limited. First in best dressed.

Deloitte hosts this event in many of their office locations throughout the year and registration is open to students up to (and including) their penultimate year of an undergraduate or postgraduate technology focused degree. For more information about Deloitte's technology offering's please visit their website.



CSESoc 
RockClimbing
 put those muscles to use



Wed 23rd April
 11am
 Sydney Indoor
 Climbing Gym
 St Peters
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 AND ENGINEERING




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