# βeta

— news from computer science and engineering —



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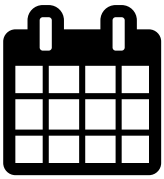
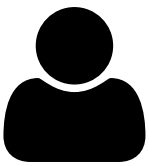
and...














issue 109 — 12 August 2015 — 15s2 week 9

# βeta

## CSESoc βeta, issue 109

A fortnightly publication from CSESoc's Beta team.
Find us online at **www.csesoc.unsw.edu.au**
Got some good content? Email **beta@cse.unsw.edu.au**

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## In This Issue



# The News

**Google, by Alphabet.** Google (the conglomerate) has become Alphabet, the conglomerate. Alphabet will retain all existing Google operations. The Google subsidiary will be led by current Product Chief Sundar Pichai. Freed from the Google brand, Alphabet may better manage the increasingly bizarre and loosely-coupled stable, keeping speculative ventures siloed from the cash cows: ads and search.

**Administrative death pronounced freely.** Australian infosec researcher Chris Rock will kill you—on paper. After supplying another doctor's registration number, obtained from a public record, Rock obtained an account on Australia's online registry and found he was able to kill and give 'birth' to any person in any state or territory. All submissions must be verified by a funeral director, so he hacked up a website for a fake business and was promptly given a second account. This is Fairly Bad.

**Firefox vulnerability.** A critical vulnerability in Mozilla Firefox has been found, leading to significant data loss. Exploits will find themselves able to access arbitrary files on the host system, including emails, password vaults, private keys, you name it. Update to 39.0.3 immediately to avoid catastrophe.

**Microsoft embiggens bug bounty.** If you happen to have any novel exploitation techniques lying around for shiny new Windows 10, Microsoft have bumped their maximum bug bounty to US$135k. Of course, bug bounties are about a lot more than the headline rate. Many software vendors will pay out the nose for small vulnerabilities, and these programs are open to all, including you. Check out Microsoft's program at `https://aka.ms/BugBounty` and head to BugCrowd if you'd like to break non-Redmond things for dosh.

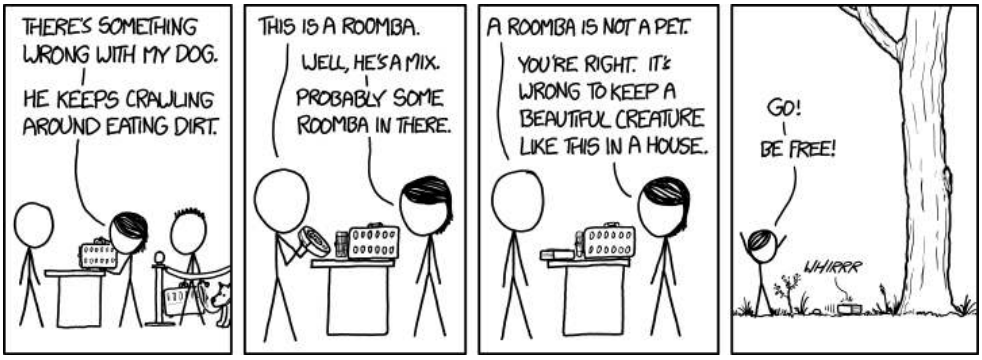
**Go x86, get negative rings.** Researcher Christopher Domas, speaking at Black Hat, has demonstrated an attack on older x86 chipsets able to grant access to ring -2. A successful attacker would see their arbitrary code executed as if it were Intel firmware, with powers above and beyond the OS, and the ability to persist long after the OS is reinstalled. Chipsets from Sandy Bridge onward (~2012) should be safe. Those with older hardware shouldn't panic, as the attack is quite difficult to pull off in practice—just not difficult enough to prevent the nightmares.

**WiFi talk and VoLTE.** The wireless spectrum will be breathing a sigh of relief this week, as Optus announce voice and text over WiFi, a change that will reduce reliance on cell towers while remaining transparent to the user. Competitors appear to have similar things in the works. Meanwhile, Telstra seems busy making Voice over LTE happen. Who cares, really? I just ran out of news items, and this was the best of a few bad options. We are very reliant on some very crowded channels of the spectrum. OK, column over. Bye

■ *Timothy Humphries*

Because we're running low on content, as usual,
enjoy some assorted detritus from the Internet.

(As usual, it's an xkcd.)




It's probably for the best. Since Roombas are native to North America, it's illegal for Americans to keep them in their houses under the Migratory Bird Treaty Act.



# YOUR ARTICLE HERE!

beta@cse.unsw.edu.au

Don't forget to check out the Beta website,
where we've also found some archived issues.

(If you have PDFs of Beta from 2012 or before,
we'd love to have them for completeness.
Send them in to csesoc.beta.head@csesoc.unsw.edu.au.
We may be able to get you a prize.)

and now, on with the show...

# The Original Programmer

Picture in your mind who you think was the first ever programmer.

If you know a little about the history of computing, you would think this programmer to be an American, most likely working for the military. It's true that the US military gave us email and the internet, two things that now rule our lives, and Alan Turing's work with the British forces in World War II layed the foundations for the modern computer. However, the origin of Computer Science has a more romantic background to it, and it starts with the only legitimate child of the famous English poet, Lord Byron.

Augusta Ada Gordon was the daughter of a brief and unhappy marriage between George Gordon, Lord of Byron, and Isabelle Milbanke. She was born in London on December 10th, 1815 and never knew her father, as her parents separated and her father left the country four months after her birth. Detesting the notion that Ada would become anything like her father, Milblanke brought up Ada as a student of science, mathematics and music—seen as the time to be the logical schools of thought, as far away as possible from poetry. Milblanke also forced her daughter to lie completely still for extended periods of time, believing that this would develop self-control.

Indeed, the diet of critical thinking and logic worked. As young as 13, Ada was known to produce designs for flying machines and boats, which were dominating the pages of newspapers in the midst of the industrial revolution. Ada was given access to tutoring in mathematics and science, and her and Lady Byron often interacted with the noblemen in society who were studying the sciences of botany, geology and astronomy.

At the age of 17, Ada, along with her mentor and friend Mary Somerville, put on their most beautiful dresses—as was to be expected from noblewomen—and set out for a night on the town in London. Ada had become somewhat of a character on the dancefloors of London, inheriting her father's charm and making plenty of friends. During this particular night out, they ran into a friend of Somerville: Charles Babbage, Lucasian Chair of Mathematics at Cambridge. Babbage had already become a small time celebrity, and his work in calculating machines interested Ada greatly, as it was the intersection of her passion for mathematics, and the design of machines. Ada and Charles quickly became friends through their shared passions, and remained friends up until Ada's death.

Babbage saw the potential in Ada, and set her up studying Advanced Mathematics with a friend of his, the University of London's Augustus de Morgan. At age 19, Ada married her family's physician, William King, and when King became the Earl of Lovelace, Ada became better known as 'Ada Lovelace'. Lovelace remained fascinated by Babbage's "Difference Engine"—a machine that would compute the values of polynomial functions. But the difference engine was never finished, and Babbage decided to shift his focus to a more complex machine: one that would be programmable by punch cards. He developed the concepts, and part of the implementation for the machine, together with Lovelace, however funding was hard to come by for a second machine, while his first remained unfinished.

Lovelace had well and truly earned the respect of Babbage, as well as multiple noblemen by this point. Babbage would refer to her as "The Enchantress of Numbers", based of some of his own musings, where Lovelace was described as, "*that Enchantress who has thrown her magical spell around the most abstract of Sciences and has grasped it with a force which few masculine intellects could have exerted over it.*" Babbage had also gained some followers in Italy, which further brought Lovelace into the fold, as she spoke Italian.

In 1842, at age 27, Lovelace was asked to translate a paper written about Babbage's new machine, the Analytical Engine from Italian to English. Not only did she translate the paper, but she added her own notes as well, which ended up being three times as long as the paper itself. Lovelace says, "*The Analytical Engine, on the contrary, is not merely adapted for tabulating the results of one particular function and of no other, but for developing and tabulating any function whatever. In fact the engine may be described as being the material expression of any indefinite function of any degree of generality and complexity.*"

Her notes included the first ever algorithm for the first ever programmable computer, which makes Ada Lovelace the first ever Computer Programmer. She goes on to devise the concept of loops, and even predict future uses of the machines: "*Again, it might act upon other things besides number… Supposing, for instance, that the fundamental relations of pitched sounds in the science of harmony and of musical composition were susceptible of such expression and adaptations, the engine might compose elaborate and scientific pieces of music of any degree of complexity or extent.*"

The paper was published, in English, under the unassuming title, "*Sketch of The Analytical Engine, Invented by Charles Babbage, By L. F. MENABREA of Turin. With notes upon the Memoir by the Translator A.A.L*"—standing for, of course, Augusta Ada Lovelace. Only her initials were originally published, to hide her gender.

Sadly, this was to be Ada's peak. Throughout the 1840s, her life became dominated by rumors and scandal, of affairs with many men, and of a large gambling debt. She died in November of 1852 from uterine cancer, aged 36, and was buried next to her father, whom she never knew. Babbage's Analytical Engine was never finished.

As much as we all wish that this story had a happier ending, all we are left to do is pick up the pieces and learn as much as we can from them. Today, a programming language developed by the US military is named Ada in her honour. 'Ada Lovelace Day' is celebrated on the 13th of October and recognises the achievements of women in science, technology, engineering, and mathematics. Her work is thought to have been the inspiration behind Turing's work a century later. And we can all see her legacy whenever we use a computer, phone, tablet or smart-watch, as it's likely that none of these would have been programmable if not for her. It really is funny to think how a few drinks with a stranger in a pub in London changed the course of history, and sad it is that women are so under-represented in a field pioneered by a woman.

■ *Jake Bloom*

# The Quantified Self

*It seems there are more reasons to learn machine learning than you'd think.*

One of the great blessings of modern information technology is our ability to collect lots of data and not do anything with it. This has facilitated a new trend in the self-improvement world known as the quantified-shame^Wself movement. In theory, this involves collecting data about your health and habits and using it to determine how to take action in changing them for the better. In practice, at least for me, it involves downloading as many apps as I can to track everything possible about me with my available hardware.

Starting the with basics: simplistic manual tools like *TickMate* or *A Time Tracker* (both fairly obscure open-source Android apps) that allow you to track Arbitrary Things! Who wouldn't want to track whether, or for how long they walked the dog, or flossed their teeth, or chipped away at the latest zombie-vampire lord-of-the-flies-esque romantic comedy novel. I found these apps were wonderful until I realised that I would often forget to fill them in (do you seriously expect me to press a button *every time* I take a sip from a cup of water?), so naturally I moved on…

*TagTime* is just like a time tracker but you never have to remind yourself to use it! Randomly, with an average of 45 minutes, my phone will make a distinct sequence of vibrations alerting me to the fact that I am due to be sampled! That's right! Random sampling! So you don't anticipate when you're about to get caught out scrolling endlessly down your Facebook feed, and as the number of samples approaches infinity, your TagTime log becomes more of an accurate representation of you, so after a few months, you can, err, I'm not really sure, actually.

Let's move on to things I don't have to interact with! *Google Fit* somehow manages to work out for how much time you've been walking, running or cycling each day, despite how dodgy some of these accelerometers are (better than the GPS in my Nexus 4, anyway). I've been using this for a few weeks now, and it astounded me how many times I've managed to get to the default one hour goal, and it brought me to a sad realisation: I'm walking far too much! I moved on campus to try and *minimise* my commute, and I end up wasting all this time walking! Clearly I need to move to the Barker Apartments so it isn't as far to K17, or better still, move my mattress into the old Socs office.

*RescueTime* is even more depressing: It tracks everything you do on your personal computer. However, I must admit, it does quite a good job of classifying the most obscure things, like my IRC client as a communication tool, and that *My Little Pony/1984* fanfic I was reading as entertainment, although it unfortunately doesn't know when I'm using Facebook, so when I get my weekly email from *RescueTime* telling me what a terrible person I am, 54% of my time is apparently a productivity-neutral category labelled 'Utilities'. Heeeh… [1]

After all this fatiguing data-collection, I began to ponder the point of all of this, until one day, I came across an interesting paper about a machine learning technique known as Random Forests™. After reading a paragraph, I realised that this was exactly what I needed! I exported every piece of data I could possibly find, aggregated it into days, categorised each of them with my subjective log of sleep quality that evening, pumped it all into a Random Forest™ to train it. I spent days of tinkering with input data, trying to determine what I need to change about my lifestyle to feel like getting up in the morning, I noticed that no matter what I changed, the Random Forest™ would tell me that I would never achieve this.

"Oh wow!", I exclaimed. "This is exactly the kind of disruptive technology the quantified-self market needs! Who could possibly have conceived that what people really need is a sophisticated recommendation engine that consistently told you that your goals were impossible!" I quickly came up with a name that would resonate more with the market than 'Random Forests™' would: *Bayesian Winning-At-Life Recommendr*. I swiftly registered the domain name `bayesianwinningatliferecommendr.institute` and hacked together a website filled with superfluous CSS transitions and purposeless Ajax queries, hoping to maximise the activity of the Internet's various hype machines and accrue offers from as many venture capital firms as the global economy could manage. I went to bed with *far* too much adrenaline that evening.

Late at night, in the REM stage of my sleep cycle, I saw two ghostly figures wander into my room. I recognised them immediately as the Professor/PhD student duo who published the original paper on Random Forests™. "Take down your site, or we'll sue!" they demanded. I refused, kindly reminding them that the only means they had to do so was their trademark, which I had already carefully scrubbed from my elevator pitch. "We *do* have more than one trademark, you know. We also trademarked the letters 'R' and 'F', when they occur in that order." It was at this point that I realised that there was no way I could market *Bayesian Winning-At-Life Recommendr* without using the substring "rf". How could I possibly describe how it outper*f*orms all the other purely super*f*icial competition. How could I make the claim that this power*f*ul recommendation engine is so per*f*ect and wonder*f*ul? I woke up in a cold sweat, leaping towards my laptop, logging into my server, typing `sudo killall python perl ruby nginx apache` having no time to remember which ones I used, selling the domain name off, deleting all my statistical models, uninstalling all quantified-self apps, overwriting all of my disks with random bytes… only to realise that by some supernatural hand, all of this had already been done for me.

So, uh, yeah. Quantified-self is actually great when it's done properly; but that typically involves self-experimentation. This may be an article for a time when I'm better at it.

■ *Daniel Phillips*

[1] Some details after this point may be fabricated.

# Upcoming Events

**every Wednesday** CSESoc's Weekly Barbecue — social
*1–2p, John Lions Garden*

Come on down to the John Lions Garden for your weekly dose of free barbecue, on a brand new day in an old favourite spot! Don't forget to pick up your copy of CSESoc βeta, and make some new friends!

**13 August** CySCA 2015 Information Session — tech
*9a, K17-117*

Want to see how to break in to the Cyber Security industry? Come to our information session to see if you want to take part in the Cyber Security Challenge Australia.

**16 August** Google University Graduate Test — careers

Calling all BS, MS and PhD students expecting to graduate in 2016 and interested in a career at Google, it's time to register and start practicing for the Google APAC 2016 University Graduates Test!

Registration is now open with a practice round on August 16 and the first of four online tests happening on Sunday, August 23, 2015. Students can participate in one or all of the tests. The dates and times for all tests can be viewed on the schedule page. The top participants in each online test may be invited to interview at Google.

For more details, head to
`csesoc.unsw.edu.au/blog/google-apac-2016-university-graduate-test`

**20 August** Engsoc Sports Day — social
*Village Green*

ENGSOC's sports day is coming up, and we're looking forward to putting in a strong showing for CSESoc! Come down to the Village Green on August 20th and support CSESoc in the battle against other engineering societies.

The touch footy team is looking in good shape, but if you are interested in running a Soccer or Ultimate Frisbee team, drop us an email today at csesoc.social.head@cse.unsw.edu.au, and we will set you up!

For more details, head to
`csesoc.unsw.edu.au/blog/engsoc-sports-day`

# Welcome to Unswot

In the rapidly innovating IT world, fast-moving startups are cropping up in abundance. Unswot is a UNSW-based startup which seeks to bring back intellectual chats over coffee, but with a modern technological twist.

Unswot aims to bring the human element back into conversation, reversing the conventional lecture, tutorial or seminar. It's a platform for academics to discover, host, and participate in informal, face-to-face discussions—'Unswots'—designed to promote discourse on a spectrum of creative, unconventional and thought-provoking topics. Pilot topics have ranged from the Rwandan genocide, to anti-piracy laws and the international community; hosts simply post their topic of interest on the Unswot website, and can connect with people of similar interests, whilst enjoying free coffee at various on-campus cafes.

With this promising new startup hot on our hands, the Unswot team have curated some of the most engaging tech Unswots for the next fortnight. Join the conversation at `unswot.com`!


**19 August** Google Docs vs. Microsoft Word
*2p, E10 room G19* Colin Xu

As a user of both Google Docs and Microsoft Word, I'd like to discuss the strengths and weaknesses of each word processor, and (time allowing) possibly the rest of each suite.

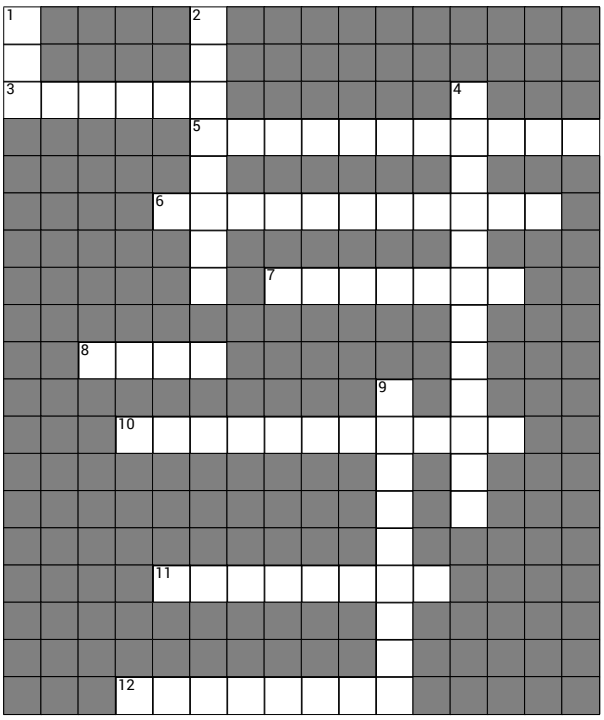
**25 August** The technological singularity—should we be worried?
*12p, Campus Village Café* Suman Prusty

As computing power grows, day by day, artificial intelligence becomes more of a reality. This UNSWOT will discuss the concept of the technological singularity, and whether humanity should fear.

■ *Shariq Nabi* ■ *Colin Xu* ■ *Christy Shen*

# Puzzles

## Crossword



**Across.** **3** Computer used to provide services to clients. **5** Parental circuit board **6** Group of several bits containing an operation code **7** Group of integrated circuits, or chips, designed to work together **8** Data storage scheme across multiple hard disk drives **10** Register in a CPU where intermediate arithmetic and logic results are stored. **11** Computer programs and other kinds of information read and written by computers **12** Fixed programs and data that internally control various electronic devices

**Down.** **1** subsystem that transfers data between computer components inside a computer or between computers **2** device that is used for entering data into, and displaying data from, a computer **4** Pocket sized computer, with apps! **9** Computers used for bulk data processing, no clouds involved.

## Takuzu

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## Brain Teasers

**A.** Using a 5 liter jug, a 3 liter jug, and a hose, can you measure 1 litre of water?

**B.** How about 4 litres?

**C.** You are given 12 coins of equal size and shape; one of them is a fake. We do not know if it is heavier or lighter than the others, but want to find out. Can you determine which one is a fake and if it is lighter or heavier by weighing coins on a balance scale a maximum of three times?

## Issue 108 Solutions

### Brain Teasers

**A.** Yes; for example, quines must have access to their own source codes to print them.

**B.** Turn the first one on and wait a few minutes, then turn it off and turn the second one on. Go down. If the light bulbs are hot but off, it was the first one, if they're on, its the second, and if they're neither its the third. Alternatively, if your servers are set up correctly then you should be notified when they come online and shouldn't need to go down at all.

**Bonus.** A canary with the super-user password.

### Takuzu

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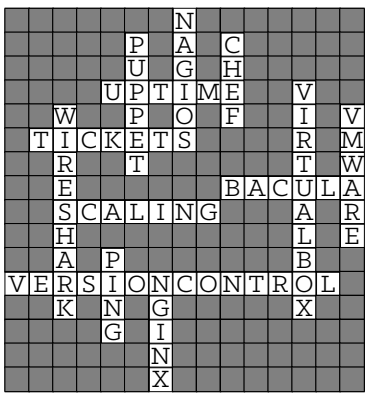
### Crossword



■ *Emily Saunders Walmsley*

# This Edition of βeta Sponsored By...














## Hoodie Update

'Code, Sleep, Eat' hoodies are still in stock at the Socs office on level 3 of K17.
If you pre-ordered and haven't yet collected, now's an excellent time to do so.

■ *Lavender Chan*

## The Last Word

Well, here we are: the end of another week's Beta. I hope you enjoyed it, and hey, we did too.

So, who read Mary Ann Davidson's bombing of the blogosphere yesterday with her piece, "No, You Really Can't"? (Who read it *before* Oracle took it down?)

From an information security position, Davidson has put herself and her company into a truly terrifying position. By hallucinating that an end-user license agreement would be any sort of protection of one's intellectual property, and the fact that these remarks are coming from a company which happens to provide a suite of widely-deployed data storage and processing tools, Davidson has painted the largest, most obtrusive "kick me" sign on Oracle's back.

Because we all *know* that when people of a Certain Ethical Mindset get told to stop pushing the envelope because it's violating an EULA, they *push the envelope harder*.

And if Oracle's products *were* completely vulnerability-free, they might be in a sane position to do so. Unfortunately, they have a chief security officer who believes that an EULA is protection enough, and that strikes enough doubt into any reasonable individual that it's impossible to assume Oracle have done security right at all.

Anyhow, that's enough of me rambling on. If you've stumbled across anything interesting, or you're keen to get involved, join the team via the CSESoc website, or send in an article—`beta@cse.unsw.edu.au`. We'd love to hear from you, and hey, your article will very likely end up in print.

Catch you next week!

■ *Jashank Jeremy*