

Kernel Engineering

- What, why, and how

Brendan Gregg

Fishworks, Sun Microsystems

About this talk

- Kernel Engineering as an Aussie
 - and other highly technical professions
- Going to the US to work
 - or, working from Aus
- What I wish I knew before I did this...

Why this talk?

- Australia is far away from much software engineering
 - especially Solaris
- Understanding engineering is useful for:
 - customers of software
 - learn how technologies really work
 - understand why they were designed
 - people considering it as a profession
- Later today I'll give a technical talk on DTrace

\$ whoami

- author of:
 - lss
 - baud
 - ged
 - bottom
 - /dev/notrandom
 - /dev/bnull

I'm better known from:

- Staff Engineer, Fishworks, CA, USA
 - L2ARC, DTrace IP provider, ...
- DTraceToolkit
- blogs.sun.com/brendan
- Shouting at JBODs

Contents

- *Part 1: Kernel Engineering*
- Part 2: Other Professions
- Part 3: Working from Aus
- Part 4: Working in the US

A day in the 'life' of a kernel engineer

- It varies. Can be:
 - 50% email
 - 60% testing and troubleshooting
 - 10% meetings and design
 - 20% code development
- ... yes, that's >100%, tell me about it...

Kernel Engineering Culture

- screwing up (because you will)
 - apologise, take responsibility, fix it, don't argue.
- code-review
 - if it is rejected, you **don't** putback.
- asking for help
 - then listening, and admitting you were wrong (because you will be)
- perfection
 - if there is a better (elegant) way to do it, then do it

Coding

- if it isn't tested, it doesn't work
 - Fishworks has a test suite with thousands of tests
- style is law (cstyle)
- keep it simple

Performance

- “if it wasn't benchmarked, it performs badly”
- Lots we don't know – always interesting
- Finding perf problems is usually easy
 - Finding the ones that matter can be hard (DTrace helps quantify)
- Look for the low hanging fruit first, then dig deeper

Entertainment

- ENOCOFFEE
- ENOBEER
- easter eggs
- P5 bugs

Side Effects

- When writing this slide I got the following crash:

```
unix`vm_page_free_prepare+0x26  
unix`vm_object_lock_try_shared+0x54f  
unix`vm_object_lock_try_shared+0xb8d  
unix`vm_object_lock_try_shared+0xf2a  
unix`vm_map_simplify+0x13e9  
unix`vm_map_remove+0x91  
unix`mach_vm_deallocate+0x84  
unix`munmap+0x9a  
unix`unix_syscall+0x23c  
unix`lo_unix_scall+0xe3
```

Side Effects, cont.

- Sorry, I made that up.
 - how many people flinched?
 - how many checked the stack to see if it was *their* code?
- Other side effects:
 - possessive of own code base
 - haunting feeling of unfinished business

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Other Professions

- That we don't have much exposure to in Aus:
 - Performance Engineer
 - Benchmark Engineer
 - Test Engineer (unsung heros)
 - Technical Writer

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Working from Aus

- Positives

- Communication is easy: email, IRC, AIM, ...
- Webcams give a sense of presence

- Negatives

- miss out on many conferences (except for KCA!)
- always dialing into meetings (negative?)
- constructive arguments more difficult/slower over email

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Getting a US work visa

- This is from personal experience
 - I'm not authoritative for this material
- It's recommended to use immigration lawyers, which companies like Sun provide access to

US work visa types

- E-3
 - Good: Aussie only (quota lasts longer)
 - Good: Spouse can work
 - Good: Can renew indefinitely
 - Bad: Can't change jobs
 - Bad: Must leave country within 10 days if job ends

US work visa types, cont

- H-1B
 - Good: Can renew up to 6 years
 - Good: May be possible to change jobs (responser)
 - Bad: Spouse can't work
 - Bad: limited number, can run out in 1 day
- green card
 - Good: work anywhere
 - Bad: much harder to get

Paperwork

- you'll need to fill out a LOT of forms
- (DS-156, DS-157, LCA, ...)
- gather this information beforehand for quick reference
- this is what immigration law firms do, in a giant, giant database

Basics

- name
- DOB
- place of birth
- nationality

ID numbers

- passport
- tax file
- SSN
- drivers license

family info

- full names
- maiden names
- dob

every academic result

- title
- date started, ended
- address of institution
- phone number of institution
- (check your CV, Uni websites)
- Tip: having a bachelor or higher may be a requirement

entire employment history

- job title
- date started, ended
- address of employment
- supervisor name
- phone number
- (check your CV)

current and past professional associations

- name
- IEAust, SAGE-AU, AUUG, SOSUG, ...
- (check your CV)

entire military service history

- country
- rank
- specialty
- date started, ended

every country visited during the last 10 years

- country name
- year
- (check your passport stamps)

every visit to the US

- date arrived
- length of stay
- (check your passport, old email itineraries, old boarding passes)
- Tip: keep all your boarding passes.

Every place of residence, ever

- address
- date moved in, date moved out
- (check ???)

random questions

- "Do you seek to enter the United States to engage in export control violations, subversive or terrorist activities, or any other unlawful purpose? Are you a member or representative of a terrorist organization as currently designated by the U.S. Secretary of State? Have you ever participated in persecutions directed by the Nazi government of Germany; or have you ever participated in genocide?"
- how many people have answered yes to this?

Living in the US: Essentials

- Zee not Zed
- Cache not Cayche
- “ZFS cache”

Food

- no meat pies
- no sausage rolls
- no kebabs
- no VB, XXXX
- and worst of all...

High Fructose Corn Syrup

- ... instead of cane sugar
- few soft drinks made with real sugar
- lollies ("candy") also made with corn syrup

Surviving

- BevMo (CA) sells
 - - Bundaberg Ginger Beer
 - - Tooheys New
- Several 'Aussie' shops exist
 - - TimTams
 - - Vegemite

TV

- no cricket (willow.tv)
- no rugby
- no AFL
- no SBS world news
 - or much world news at all...

Cost of living

- Cheaper
 - food
 - internet
 - domestic airfares
- More expensive
 - car/health insurance
 - phone plans
 - traffic violations

Thank You

- Questions
- blogs.sun.com/brendan