

# CITS5501 Software Testing and Quality Assurance Introduction

Unit coordinator: Arran Stewart

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# Highlights

- This lecture gives a big picture view of what we will cover and why.
- The big question: what makes software high quality? And how can we repeatedly ensure we produce software of high quality?

# Areas where testing and quality assurance techniques are used

- ... Everywhere.

## Areas where testing and quality assurance techniques are used (2)

But some of the more interesting examples:

- Verification of software properties (e.g. the provably secure [seL4 Microkernel](#))
- Model checking – Microsoft uses model checking techniques to test that driver code (which runs with high privileges) is using the API correctly
- Enforcing properties with rich type systems:
  - Memory safety
  - Microsoft's research [Singularity OS](#)
  - Encoding protocols using types ( [session types](#) )
- Extracting programs from proofs (using e.g. proof assistants like [Agda](#))

## Unit Information

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Consultation: Tues 4-5pm

Unit webpage: <http://teaching.csse.uwa.edu.au/units/CITS5501/>

Contact Hours:

- Lecture: Tuesday 2-4pm CSSE seminar room 1.24
- Workshop: Thursday 3-4pm, starting week 2

# Unit contact hours – details

## Lectures:

- “Compulsory”, probably recorded, but better to attend.
- 5 minute break at 3pm

## Workshop:

- Work through practical exercises
- Bring a laptop if you can.
- Some exercises will be assessed

## Consultation:

- Tues 4-5pm, or other times by appointment.

# Assessment

## 3 Assessed Labs

- 5% each in weeks 3, 6 and 8.
- You'll have a week to submit the work

## Automation Project

- Worth 20%, done in small groups.
- Design and execute a testing and validation strategy for some (dubious) software.

## Research Seminar

- Worth 15%, done in pairs in weeks 12 and 13.

# Schedule

- General overview of topics:
- Testing & testing methodology
- Quality assurance
- Formal methods and formal specifications



# Software quality - what is it?

- What are some ways that software can be good?  
And what are some ways that it can be bad (or, less than ideal)?

# Ensuring quality software

- There are multiple aspects to building quality software:
  - Organisational Processes – How does the software team operate?
  - Process and Software Standards – Are particular standards used?
  - Process Improvement – How is success in building quality software measured and improved?
  - Requirements Specification – How do we work out what software we should be building? And how do we work out whether we built the right software?
  - Formal Methods – Ways of proving that software is correct
  - Testing, Testing, Testing – Identifying and correcting bugs

# The software “illities”

There are many features that contribute to the success of software, and very few relate to correctness. . . :

- Usability
- Maintainability
- Scalability
- Reliability/Availability
- Extensibility
- Securitability (sic)
- Portability

# Motivations for testing

- Fear and dread

# Why test?

Testing is not just about demonstrating correctness. Testing is used in several ways in modern software development:

- Unit tests – Ensuring functional units are correct
- Integration testing – Ensuring components work together
- Acceptance testing – Getting paid at the end of the day
- Regression Testing – Don't break the build!
- Test Driven Design – “Test-first” software process
- Tests as documentation – Complete test suites are often the most accurate documentation a project has.

# Questions?

**WHY DO WHALES JUMP**  
WHY ARE WITCHES GREEN  
WHY ARE THERE MIRRORS ABOVE BEDS  
**WHY DO I SAY UH**  
WHY IS SEA SALT BETTER  
WHY ARE THERE TREES IN THE MIDDLE OF FIELDS  
WHY IS THERE NOT A POKEMON MMO  
WHY IS THERE LAUGHING IN TV SHOWS  
WHY ARE THERE DOORS ON THE FREEWAY  
WHY ARE THERE SO MANY SNITCHES RUNNING  
WHY AREN'T THERE PAKY COUNTRIES IN INTERSECTION  
WHY ARE THERE SCARY SOUNDS IN FINEPRINT  
WHY IS THERE KICKING IN MY STOMACH  
WHY ARE THERE TWO SLASHES AFTER HITTS  
WHY ARE THERE CELEBRITIES  
**WHY DO SNAKES EXIST**  
WHY DO OYSTERS HAVE PEARLS  
WHY ARE DUCKS CALLED DUCKS  
WHY DO THEY CALL IT THE CLAP  
WHY ARE KYLE AND CHITMAN FRIENDS  
WHY IS THERE AN ARROW ON ARIAN'S HEAD  
WHY ARE TEXT MESSAGES BLUE  
WHY ARE THERE MUSTACHES ON OBJECTS  
WHY ARE THERE MUSTACHES ON CARS  
WHY ARE THERE MUSTACHES EVERYWHERE  
WHY ARE THERE SO MANY BIRDS IN OHIO  
WHY IS THERE SO MUCH RAIN IN OHIO  
WHY IS OHIO WEATHER SO WEIRD  
**WHY ARE THERE MALE AND FEMALE BIKES**  
WHY ARE THERE TINY SPIDERS IN MY HOUSE  
WHY DO SPIDERS COME INSIDE  
WHY ARE THERE HUGE SPIDERS IN MY HOUSE  
WHY ARE THERE LOTS OF SPIDERS IN MY HOUSE  
WHY ARE THERE SPIDERS IN MY ROOM  
WHY ARE THERE SO MANY SPIDERS IN MY ROOM  
WHY DO SPIDER BITES ITCH  
**WHY IS DYING SO SCARY**  
WHY IS THERE NO GUNS IN LAYERS  
WHY DO KNEES CLUCK  
WHY AREN'T THERE E GARDIES  
WHY IS ISOLATION BAD  
WHY DO BOYS LIKE ME  
WHY DON'T BOYS LIKE ME  
WHY IS THERE ALWAYS A TRAP UPDATE  
WHY ARE THERE RED DOTS ON MY THIGHS  
**WHY IS LYING GOOD**  
WHY DO TESTICLES MOVE  
WHY ARE THERE PSYCHICS  
WHY ARE HITS SO EXPENSIVE  
WHY IS THERE OFFENSE IN MY SHAPED  
WHY DO YOUR BOOGS HURT  
WHY ARE THERE SLAVES IN THE BIBLE  
WHY DO TWINS HAVE DIFFERENT FINGERPRINTS  
WHY ARE AMERICANS AFRAID OF DRAGONS  
WHY IS HITTS CROSSED OUT IN RED  
WHY IS THERE A LINE THROUGH HITTS  
WHY IS THERE A RED LINE THROUGH HITTS ON FACEBOOK  
WHY IS HITTS IMPORTANT  
WHY AREN'T MY ARMS GROWING  
WHY ARE THERE ALIENS  
WHY DON'T FEEL DOZZY  
WHY ARE THERE SO MANY CROWS IN ROCHESTER  
WHY ARE THERE PSYCHIC WEAK TO BUG  
WHY DO CHILDREN GET CANCER  
WHY IS POSEIDON ANGRY WITH ODYSSEUS  
WHY IS THERE ICE IN SPACE  
WHY ARE THERE ANTS IN MY LAPTOP  
WHY IS THERE AN OWL IN MY BACKYARD  
WHY IS THERE AN OWL OUTSIDE MY WINDOW  
WHY IS THERE AN OWL ON THE DOLLAR BILL  
WHY DO OWLS ATTACK PEOPLE  
WHY ARE AK 47s SO EXPENSIVE  
WHY ARE THERE HELICOPTERS CIRCLING MY HOUSE  
WHY ARE THERE GODS  
WHY ARE MY BOOGS ITCHY  
WHY ARE CIGARETTES LEGAL  
WHY ARE THERE DUCKS IN MY POOL  
WHY IS JESUS WHITE  
WHY IS THERE LIQUID IN MY EAR  
WHY DO Q TIPS FEEL GOOD  
WHY DO GOOD PEOPLE DIE  
WHY IS LIFE SO BORING  
WHY ARE WRESTLERS ALWAYS WET  
WHY ARE OCEANS BECOMING MORE ACIDIC  
**WHY IS ARWEN DYING**  
WHY AREN'T MY QUAIL LAYING EGGS  
WHY AREN'T MY QUAIL EGGS HATCHING  
WHY AREN'T THERE ANY FOREIGN MILITARY BASES IN AMERICA  
WHY AREN'T THERE GUNS IN HARRY POTTER  
WHY ARE ULTRASOUNDS IMPORTANT  
WHY ARE ULTRASOUND PIPES EXPENSIVE  
WHY IS STEALING WRONG  
WHY AREN'T THERE DINOSAUR GHOSTS  
WHY ARE THERE GHOSTS  
WHY ARE THERE FEMALE MR MIMES  
WHY AREN'T MY QUAIL LAYING EGGS

**QUESTIONS**  
FOUND IN GOOGLE AUTOCOMPLETE

