Cyber Security in HE
– The Swansea CS example –

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DITTO

Overview

Observations
Swansea CS Curriculum
Student research projects in Swansea CS

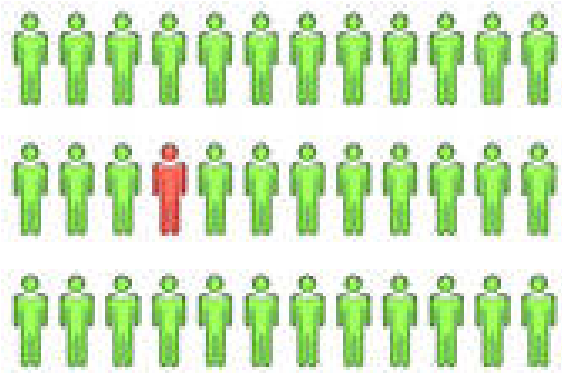
Observations

The Times They Are a-Changin'

Cyber security is now core to CS.

Good news:
Swansea CS will have
a post dedicated to cyber security.

Teaching cyber security in a CS curriculum



- Educate **all** students on the subject.
  $\rightsquigarrow$ Curriculum.
- Develop **some** students into experts.
  $\rightsquigarrow$ Student research projects.

Curriculum

Security is not only an add-on . . .

. . . but needs to be integral part of

- Any step in system design, e.g., in coding;
- Any system component.

$\rightsquigarrow$ Integrate security in all modules!

Example: out of bound errors in a C program

One approach: static analysis with Cppcheck (Version 1.59)

```
1   int main() {
2     int x[7];
3     int i = 13;
4     int flag; if (i<7) flag = 1; else flag = 0;
5     if (flag) x[i] = 0;
6     x[3] = 33; x[x[3]] = 0;
7   }
```

(a) Error message for line 5:

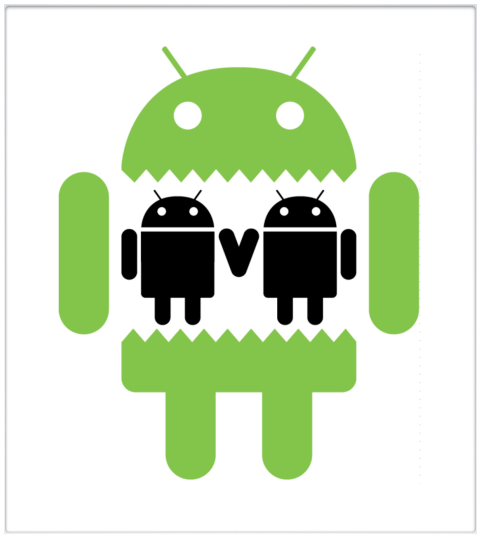
```
Array 'x[7]' accessed at index 13, which is out of bounds.
```

(b) No error message for line 6.

Illustrates: (a) false positive – (b) false negative.

Student research projects

Research-led teaching – mobile security



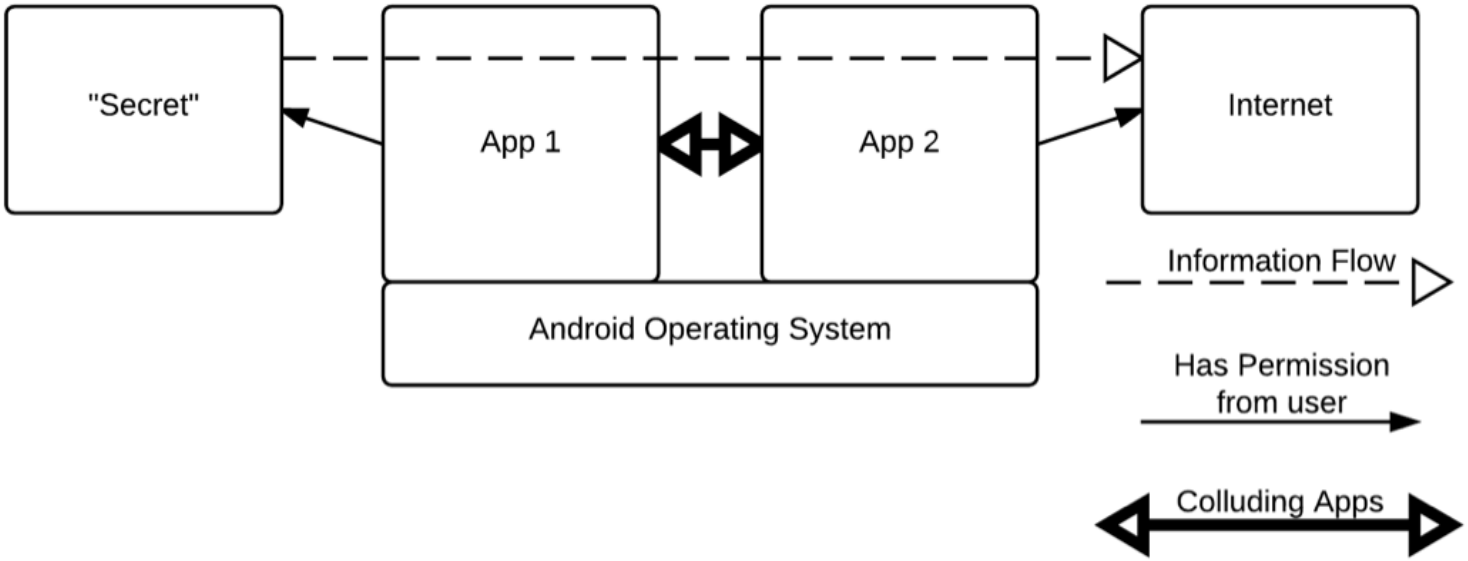
Collusion: malware distributed over several apps.

The EPSRC funded ACID project (Swansea, Coventry, London City, Intel Security) sets out to . . .

- apply model-checking for proving/disproving collusion
- deploy it at Intel's Threat Intelligence System

Student project: provide a test suite of apps

Outcome: Comprehensive test suite for collusion, systematically designed along Android security issues.



Observation:
a student can write colluding apps in less than a month.

Summary

Some concluding thoughts

- Attitude towards cyber security has changed.
- Cyber security belongs "everywhere" in the curriculum.
- Research-led teaching allows to develop experts.