Secure by Design

A novel industry practice

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omega point.

Disclaimer

This presentation is purely anecdotical.
But, we would welcome rigorous studies.

About us

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Coder and Quality Defender

Omegapoint

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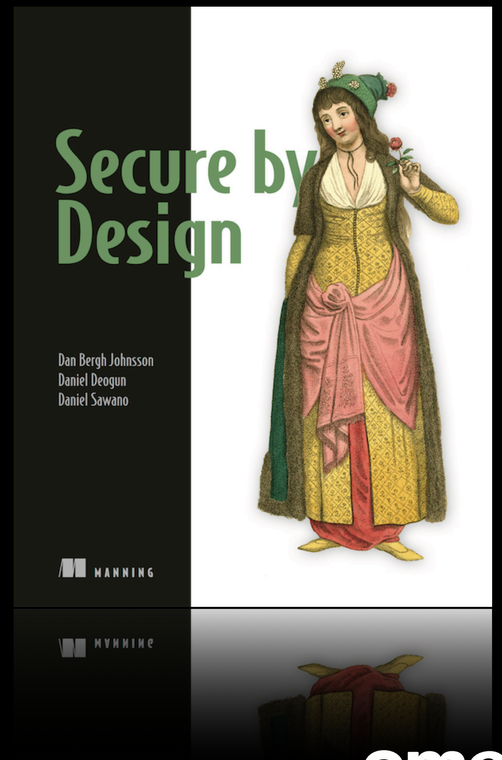
Secure Domain Philosopher

Take-aways

- Security is important but in practice often neglected
- A lot of security vulnerabilities are due to bugs
- Bugs can be prevented by software design
- *Secure by Design* collects designs that prevents bugs that manifest as security vulnerabilities



@DanielDeogun @danbjson #SecureByDesign

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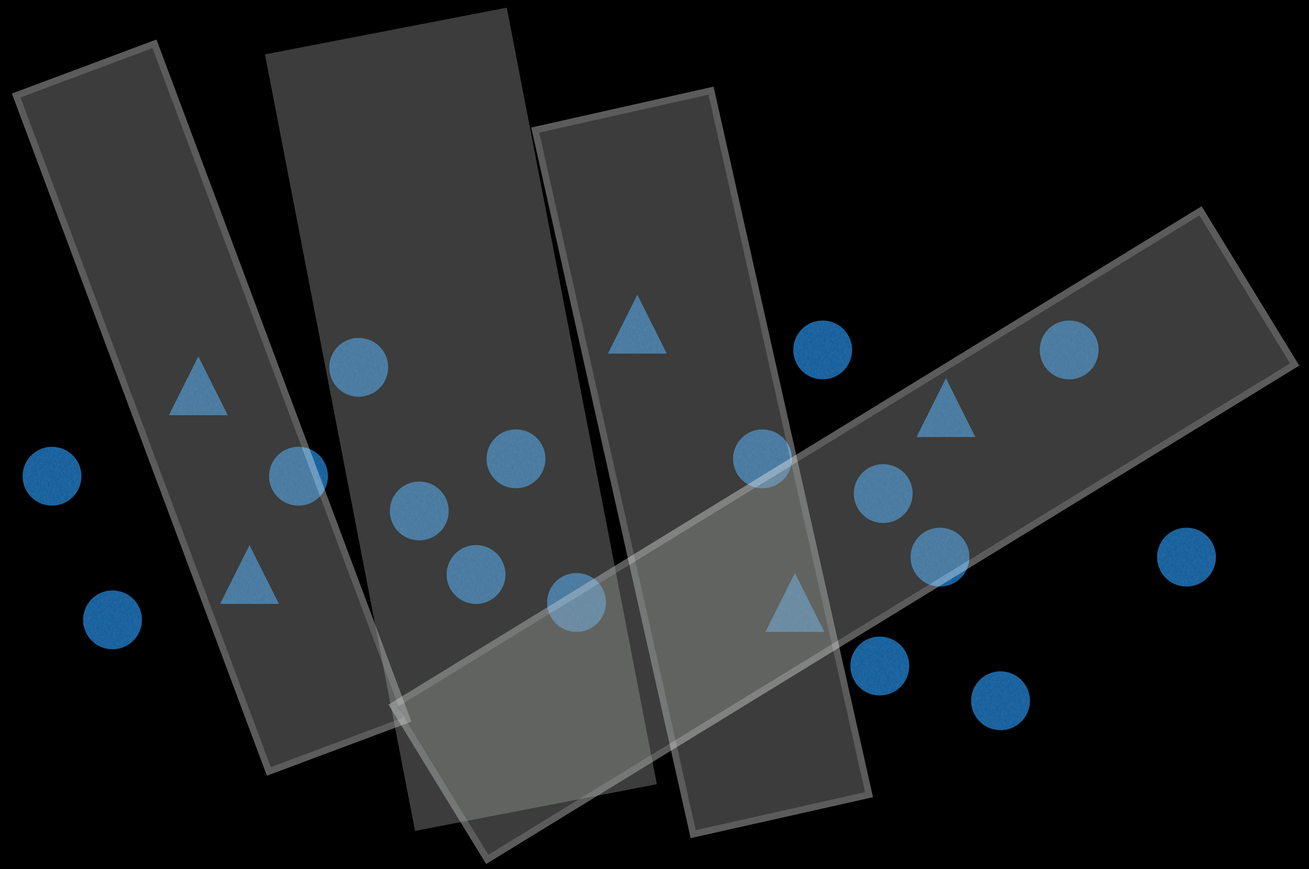
Some security vulnerabilities

- SQL Injection is often a confidentiality problem
- Business integrity problems
- Patch management

Observation: It is hard to think about security all the time - especially when you have work to do.

Secure by Design - as method



Examples of interesting designs

- *Domain Primitives*
- Consistent upon Creation
- Immutability of Objects
- Entity Snapshot
- Testing of extremes
- Taint analysis
- Faults as normal results
- Immutable builds
- Seamless deploy
- Stateless components
- Externalization of configuration
- *3 R's of Enterprise Security*

Domain Primitives

“A value object so precise in its definition that it, by its mere existence, manifests its validity is called a Domain Primitive.”

- Secure by Design

Can only exist if its value is ***valid***

Building block that’s native to ***your domain***

Valid in the ***current context***

Immutable and resemble a value object in DDD

Quantity as a Domain Primitive

```
public final class Quantity {
    private final int value;

    public Quantity(final int value) {
        inclusiveBetween(1, 99, value);

        this.value = value;
    }

    //Domain specific quantity operations...
}
```

Untangle Inside
- Cluttered Entity

```
class Order {
    private ArrayList<Object> items;
    private boolean paid;


    public void addItem(String isbn, int qty) {
        if(this.paid == false) {
            notNull(isbn);
            inclusiveBetween(10, 10, isbn.length());
            isTrue(isbn.matches("[0-9X]*"));
            isTrue(isbn.matches("[0-9]{9}[0-9X]"));

            Book book = bookCatalogue.findByISBN(isbn);

            if (inventory.availableBooks(isbn) >= qty) {
                items.add(new OrderLine(book, qty));
            }
        }
    }
    //Other logic...
}
```

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De-Cluttered Entity

```
class Order {
    private ArrayList<Object> items;
    private boolean paid;

    public void addItem(ISBN isbn, Quantity qty) {
        notNull(isbn);
        notNull(qty);

        if(this.paid == false) {
            Book book = bookCatalogue.findByISBN(isbn);

            if (inventory.availableBooks(isbn).greaterOrEqualTo(qty)) {
                items.add(new OrderLine(book, qty));
            }
        }
    }
    //Other logic...
}
```

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The R's of Enterprise Security

Rotate

Repave

Repair

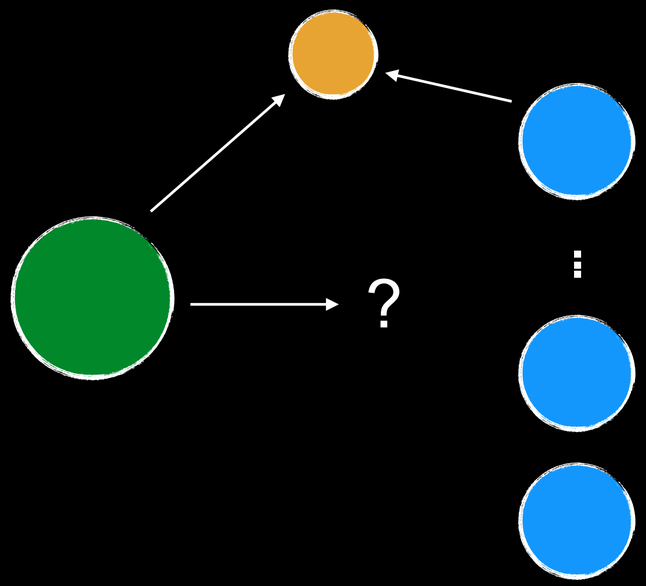
Ref: Justin Smith, Pivotal @justinjsmith

Advanced Persistent Threat (APT)

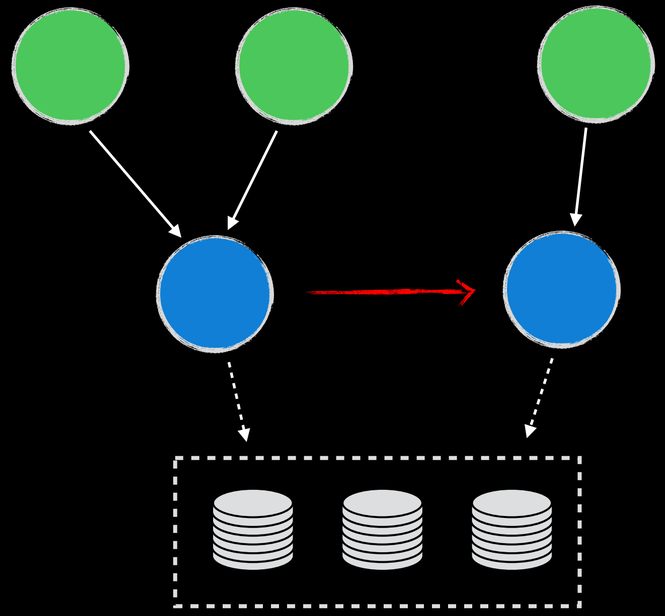
- APT is a type of attack that often result in significant data loss or damage.
- Performed over a long period of time & involves advanced techniques
- Several vulnerabilities in combination are often used to exploit the system
- Exploiting the fact that things seldom change
  - servers
  - credentials
  - ip-addresses
  - non-patched bugs tend to open up for attacks, e.g.
    - Baltimore City Ransomware
    - NotPetya attack on Ukraine
    - Heartbleed in OpenSSL

Richard Patterson https://flic.kr/p/24GcRZQ

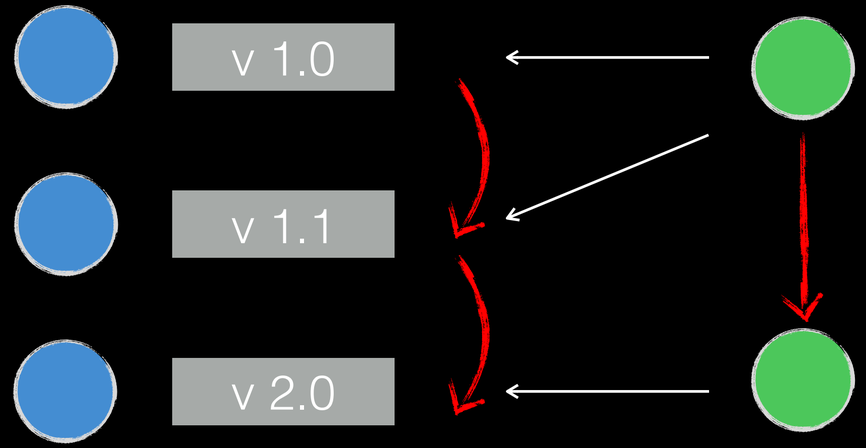
Designs Inspired from the Cloud



Service Discovery



Stateless Services



Expand / Contract APIs

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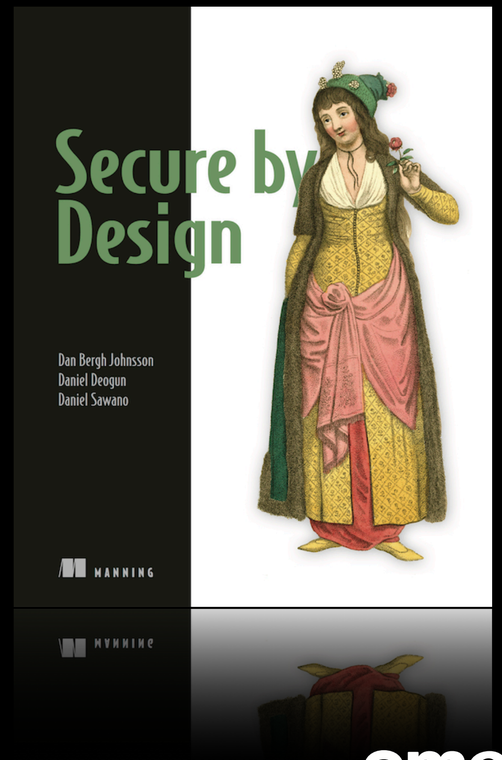

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Thanks

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