IIOT –Risk Management & Compliance in Developing Smart Solutions

Parasoft Highlights

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Parasoft Focus

Software Development

- Analysis
- Unit Testing
- Functional
- API
- Service Virtualization
- Analytics

Compliance

- Coding Best Practices
- Security
- Safety
- Regulatory

Agile / CT / DevOps

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Internet of Things (IoT) Market

$1.29 Trillion

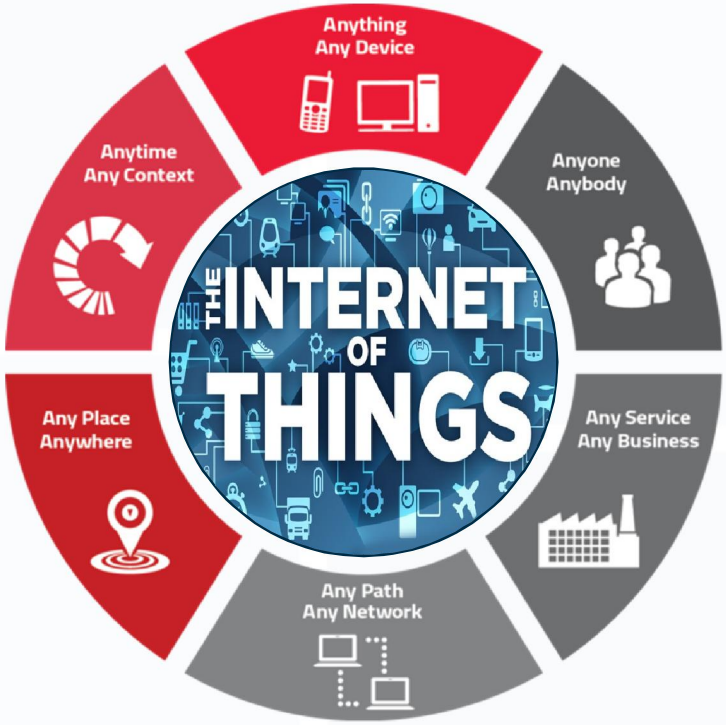
Incremental by 2020
(IDC Research)

50 Billion

Connected Devices by 2020
(Cisco, Market Report)

13.4% Growth

CAGR in 2020
(RadiantInsights)



- Convergence of IT applications, services, network gateway, embedded systems, and sensors
- Business Value
  - Real-time Monitoring, Alerts, Predictive Analytics and Diagnostics
  - Lower Operating Costs
  - Improved Services Efficiency
  - High Value to All Industries
- Other terms
  - Machine-to-Machine (M2M)
  - Internet of Everything

What is your Weakest Link?

IOT HALL-OF-SHAME

Innovations

How a fish tank helped hack a casino

By Alex Schiffer July 21

Hackers stole data from a casino by hacking into an Internet-connected fish tank, according to a new report. (iStock)

Hackers are constantly looking for new ways to access people's data. Most recently, the way was as simple as a fish tank

In a closer examination of the robot ecosystems, IOActive Labs said many of the robot platforms it analyzed use open source frameworks and libraries that suffer from known vulnerabilities such as cleartext communication, authentication issues, and weak authorization schemes.

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Examples of IOT & IIOT

IIoT: Strategy To Manage Risk & Compliance

Test the Code, Test the Integration, Test the Function, Systems to Systems Test

- Static - Runtime Analysis
- Unit Testing
- API Testing
- Load Testing

Analysis & Testing

- Code Coverage
- Code Compliance
- Code Readiness

Reports & Dashboards

- Risk Analysis
- Change-based Testing

Intelligent Analytics

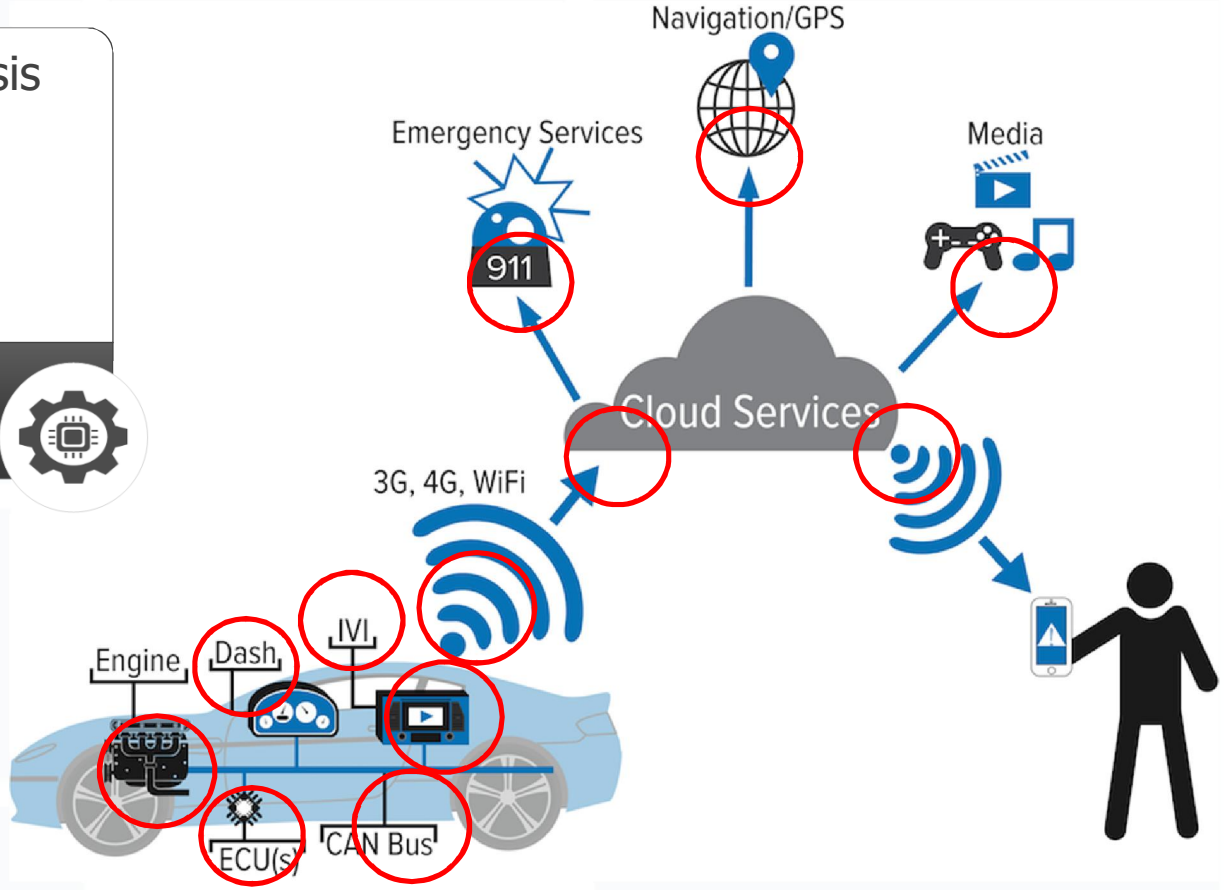
- Systems-of-Systems Testing
- Simulation

Service Virtualization

IIoT: Test the Code (White Box Testing)

- Static Analysis
- Unit Testing

Analysis & Testing



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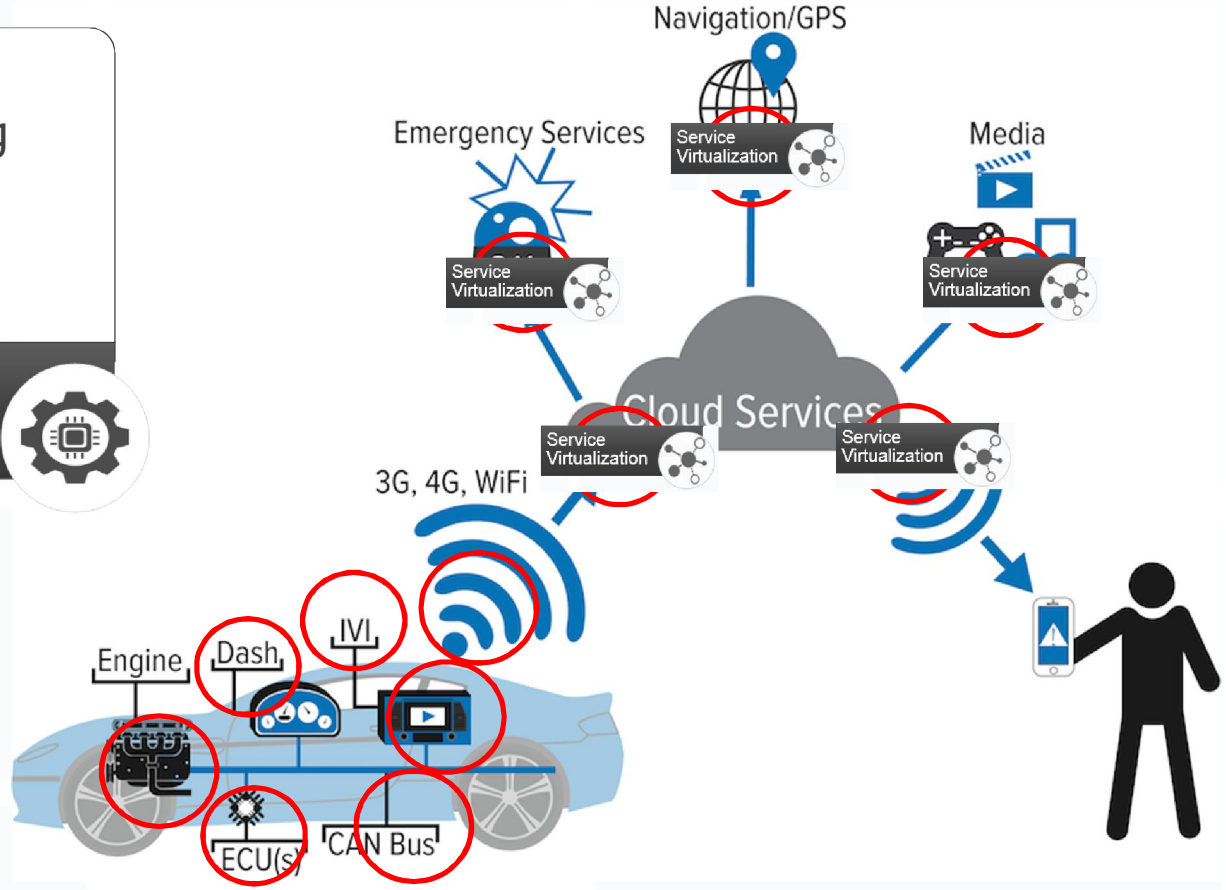
IIoT: Test the Functionality (Black Box Testing)
Test the Performance & Security (Pen Test)

- API Testing
- Load Testing
- Penetration Testing
- Simulation

Service Virtualization



Scale Up

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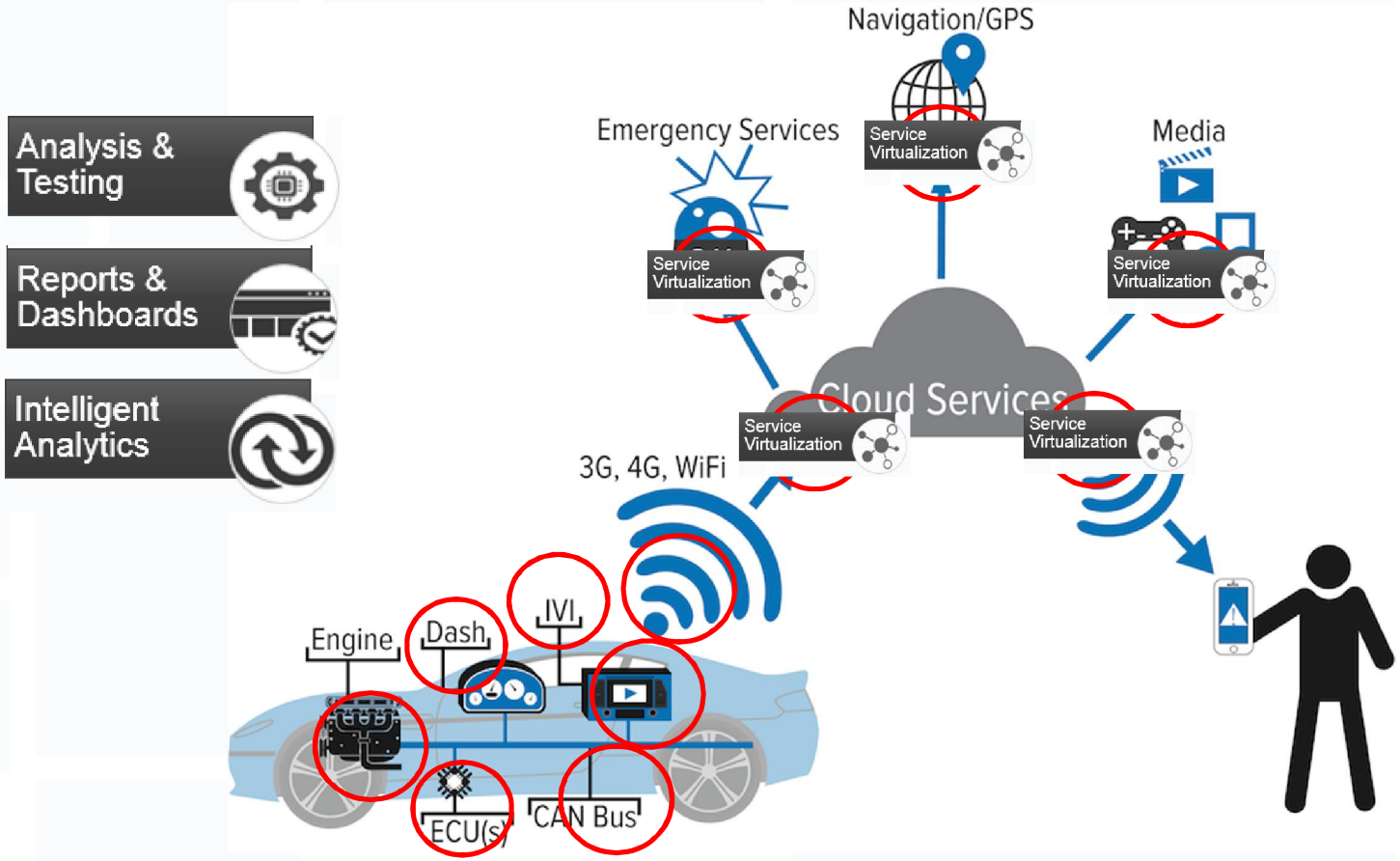
IIoT: Reporting, Analytics, Intelligence



What do you do when you see an ORANGE light at the traffic junction?

1. Slow Down & Stop
2. Go Faster
3. Depends

IIoT: Strategy To Manage Risk & Compliance

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Service Virtualization

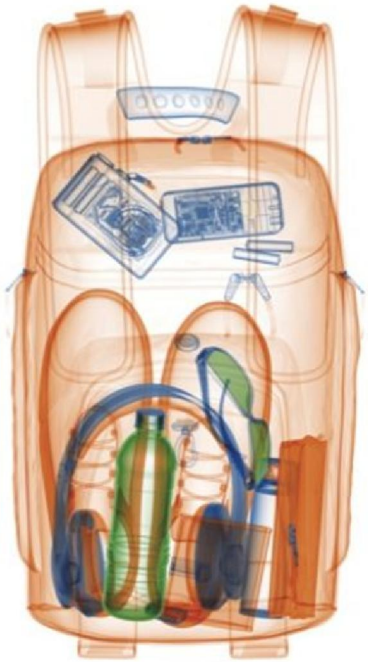
Different Environments, Different Needs

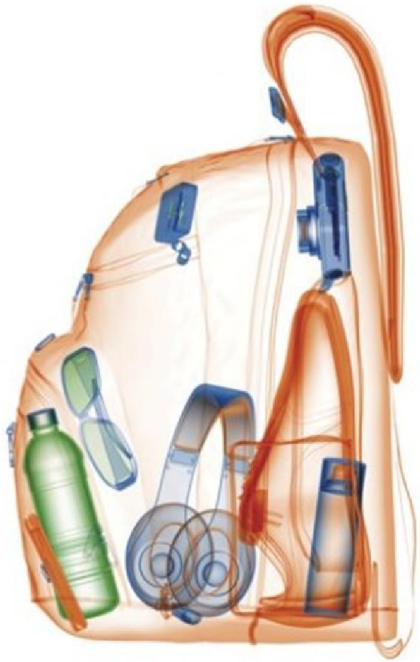
- Source code or No source code
- Own or Outsourced Development
- Mobile or Backend Applications
- Open Source or Commercial Solutions

Learn from Existing Processes

1000s of people
Even more luggage
Time Stress
Delivery Time
Potential Risk

First, You need a Scanner!





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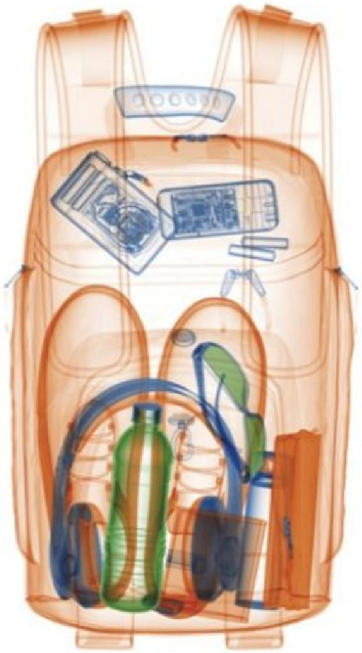
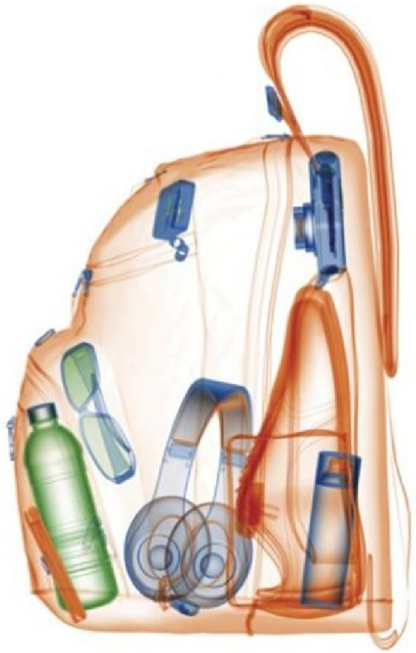
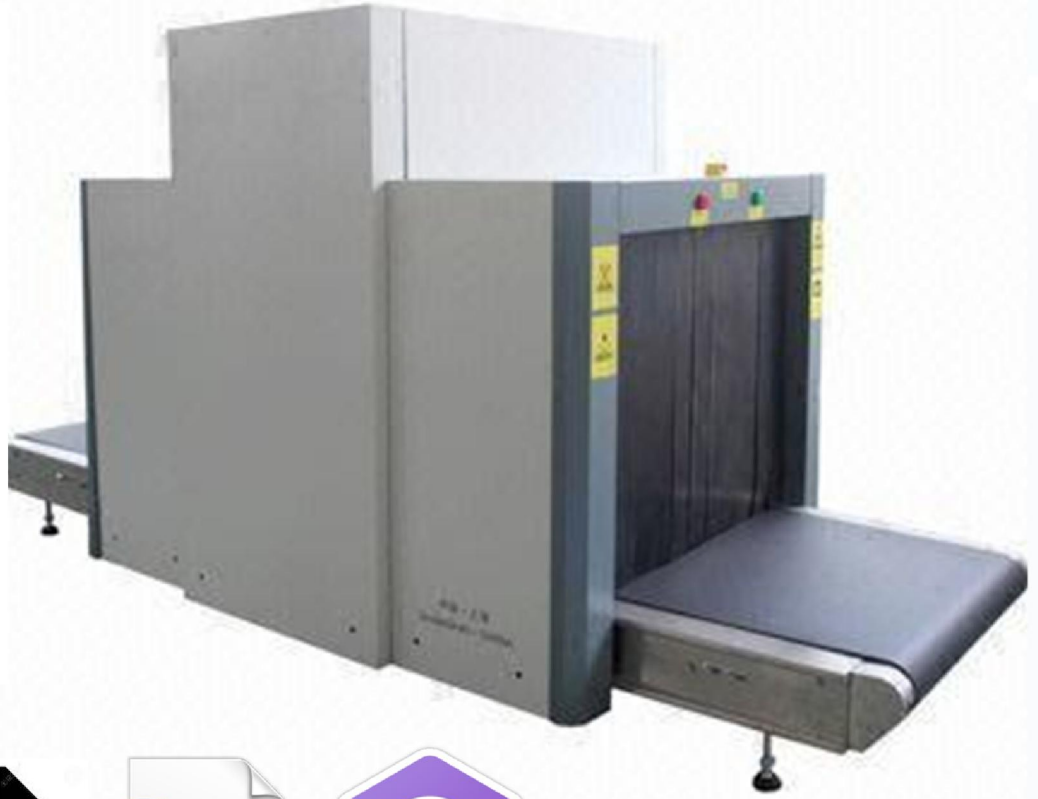
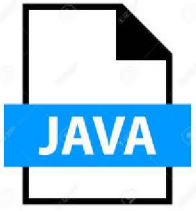
You need an App Code Scanner!









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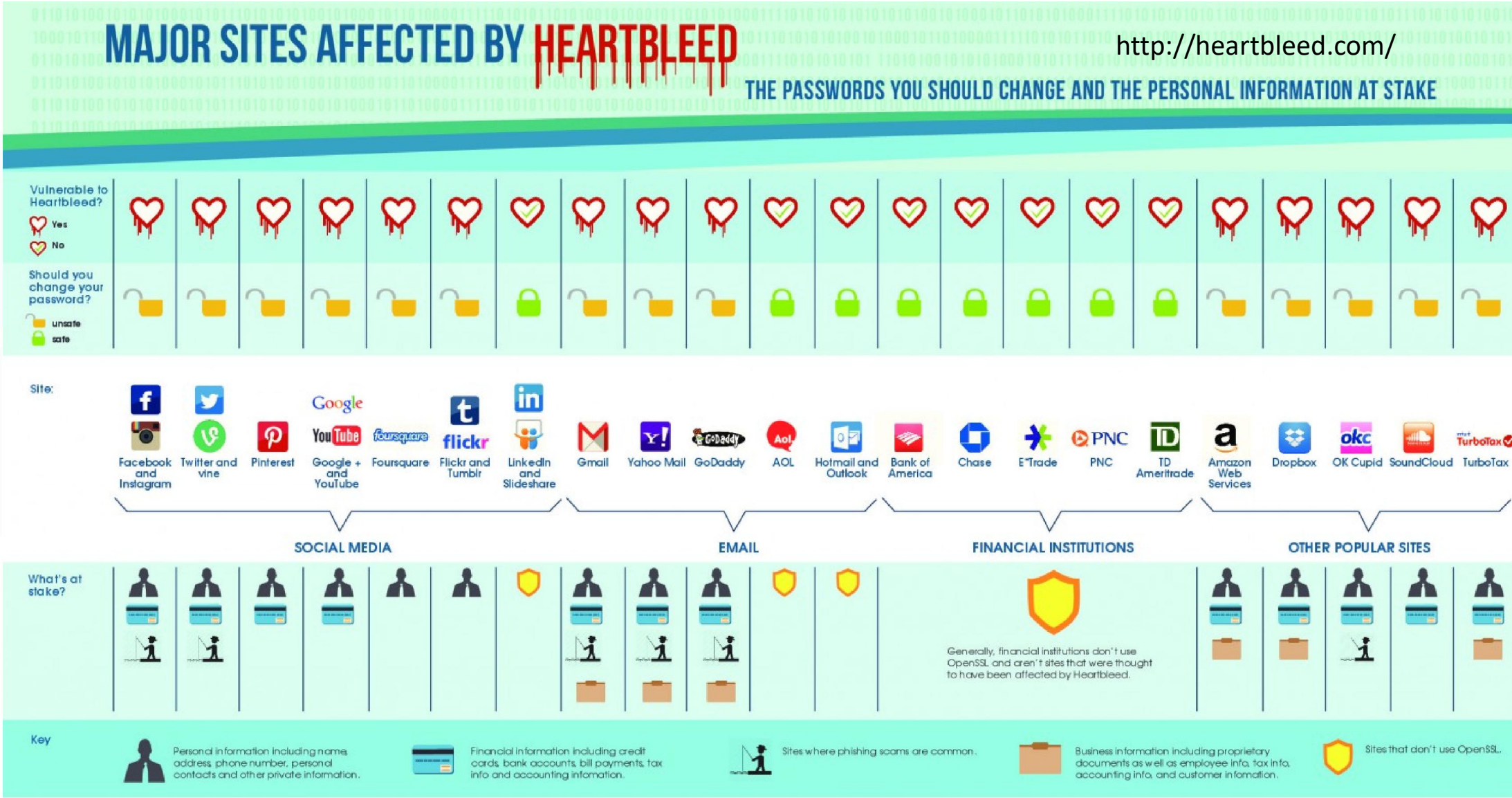
MAJOR SITES AFFECTED BY HEARTBLEED

http://heartbleed.com/

THE PASSWORDS YOU SHOULD CHANGE AND THE PERSONAL INFORMATION AT STAKE



Sources:

mashable.com/2014/04/09/heartbleed-bug-websites-affected/
filippo.io/Heartbleed/

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LWG
Certainty in an Uncertain World

Just 1 Line of Code (LoC) in 2 files

t1_lib.c

```
2436 int
2437 tls1_process_heartbeat(SSL *s)
2438     {
2439     unsigned char *p = &s->s3->rrec.data[0], *pl;
2440     unsigned short hbtype;
2441     unsigned int payload;
2442     unsigned int padding = 16; /* Use minimum padding */
2443
2444     /* Read type and payload length first */
2445     hbtype = *p++;
2446     n2s(p, payload);
2447     pl = p;
2448
2449     if (s->msg_callback)
2450         s->msg_callback(0, s->version, TLS1_RT_HEARTBEAT,
2451             &s->s3->rrec.data[0], s->s3->rrec.length,
2452             s, s->msg_callback_arg);
2453
2454     if (hbtype == TLS1_HB_REQUEST)
2455         {
2456         unsigned char *buffer, *bp;
2457         int r;
2458
2459         /* Allocate memory for the response, size is 1 bytes
2460          * message type, plus 2 bytes payload length, plus
2461          * payload, plus padding
2462          */
2463         buffer = OPENSSL_malloc(1 + 2 + payload + padding);
2464         bp = buffer;
2465
2466         /* Enter response type, length and copy payload */
2467         *bp++ = TLS1_HB_RESPONSE;
2468         s2n(payload, bp);
2469         memcpy(bp, pl, payload);
2470         bp += payload;
2471         /* Random padding */
2472         RAND_pseudo_bytes(bp, padding);
```

Missing Bounds Check!
But IT'S NOT EASY TO FIND!

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Benefits

- Improve Overall Security and Stability
- Avoid mistakes early in the source code (SHIFT LEFT)
- Detect and Prevent flow related issues
- Test for functionality when components are not available
- Test for scalability without having to implement 1000s of devices
- Applicable to not just IIOT but to any software development and systems implementation

Be Smart when you are pursuing Smart Solutions!

Thank you. Cảm ơn

Parasoft | *Automated Software Testing*