Getting your IT ducks in a row

Observations on security and infrastructure in the cloud and beyond

About Me

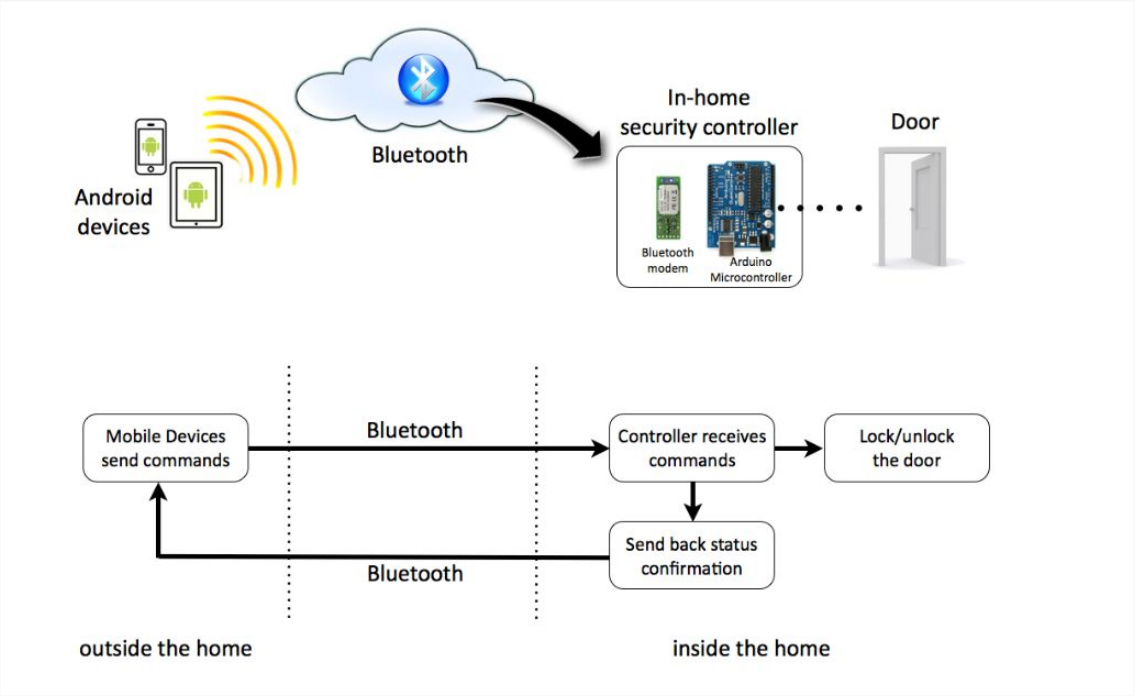
- Graduated UTM 2011
- Hired at Savant 2012
- Worked on LMS
- Transitioned LMS to TMS

- Visual Basic
- C#
- Javascript/Node
- SQL
- HTML

Overview

- Bluetooth Door Lock (Senior Design)
- Savant Learning Systems Overview
- AWS Overview
- Original IT Architecture
- Changes in Architecture
- Other Projects
- Major Events
- Looking ahead/Continue Education
- Conclusion

Bluetooth Lock



Savant Learning Systems Overview

- Online higher education platform (LMS)
- Online Law Enforcement Training Management platform (TMS)
- Record Content for SMEs
- Provide online assessments
- House records of training, users information, etc.

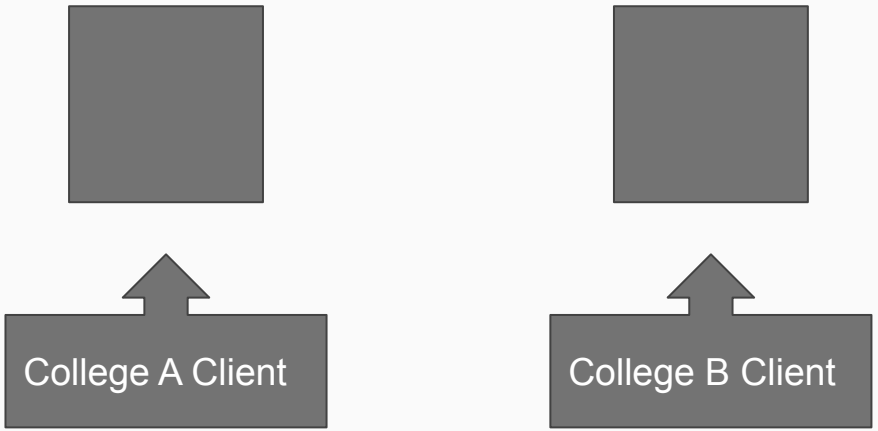
AWS Overview

Amazon Web Services

- Elastic Cloud Compute (EC2)
- Simple Storage Service (S3)
- Load Balancer (LB)
- Auto Scaling Group (ASG)
- Elastic IPs
- Cloud Front (CDN)

Original Architecture

- Each client had a server
- Single Unified Database server



Original Architecture Continued

- ASP / .Net
- Windows / IIS
- Visual Basic
- Mostly post backs to server for data get/manipulation

Pros/Cons of this architecture

Pros:

- Good (at the time) for single applications
- Easier to deploy to
- Easier to remote into/diagnose problems
- All code is in 2 languages (asp/html and VB)

Cons:

- More open to the world
- Not scalable
- Not redundant
- Code isn't as reusable
- More data is consumed by client

First Major Transition

We began using javascript and asynchronous XMLHttpRequest (XHR) requests via jQuery. In creating these webservices to handle our async calls, we transitioned over to exclusively C#

First Transition (continued)

```
66  <script type="text/javascript">
67      $(document).ready(function () {
68          // method located in ~/js/ckeditor.js
69          //switchToBasic('<%= descriptionTextbox.ClientID %>');
70      });
71
72      function showEditFeatures(editDiv, titleDiv) {
73          $(editDiv).show("slow");
74          $(titleDiv).hide();
75      }
76
77      function hideEditFeatures(editDiv, titleDiv) {
78          $(editDiv).hide("slow");
79          $(titleDiv).show();
80      }
81  </script>
82
```

Pros/Cons of this architecture

Pros:

- Faster page loads
- More modern language
- No more worrying about asp page lifecycle events

Cons:

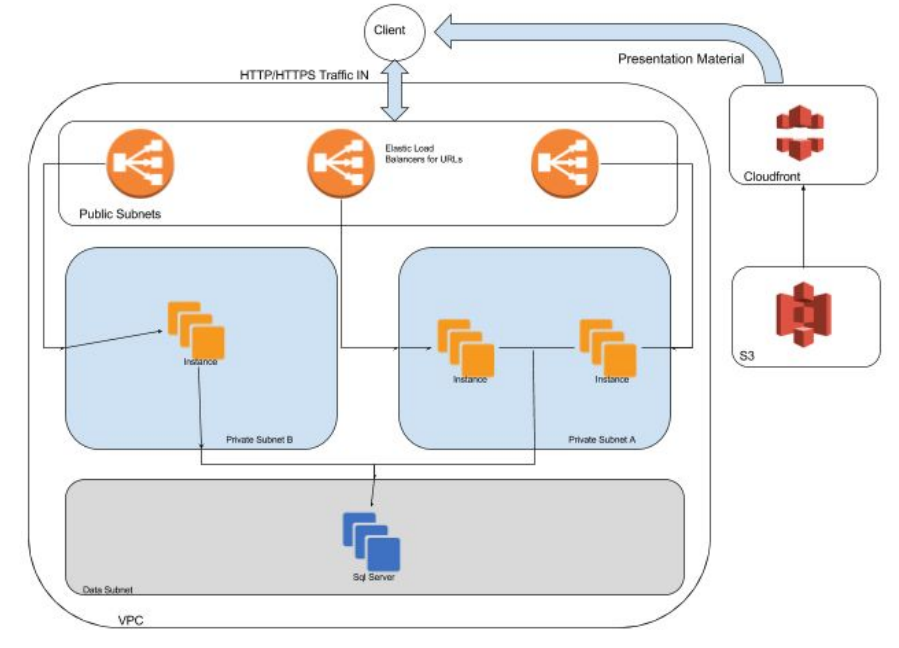
- New language to consider
- More cross-browser issues

Second Major Transition

Rework of our AWS Architecture. We:

- Tightened our security groups
- Began using Route53 for DNS routing
- Transitioned to scalable architecture
  - Auto Scaling Groups
  - Server resource monitoring
  - Elastic Load Balancers

Second Transition (continued)



Pros/Cons of this architecture

Pros:

- Servers are more secure
- More scalable
- More failovers

Cons:

- More pieces to infrastructure
- Higher costs
- More pieces to keep track of

Third Major Transition

In this transition, we began exploring javascript minimization, template based frameworks, and css reusability

- Angular
- Gulp
- Sass

Write Modern Web Apps with the Mean Stack
Jeff Dickey
ISBN: 0133930157

Third Transition (continued)

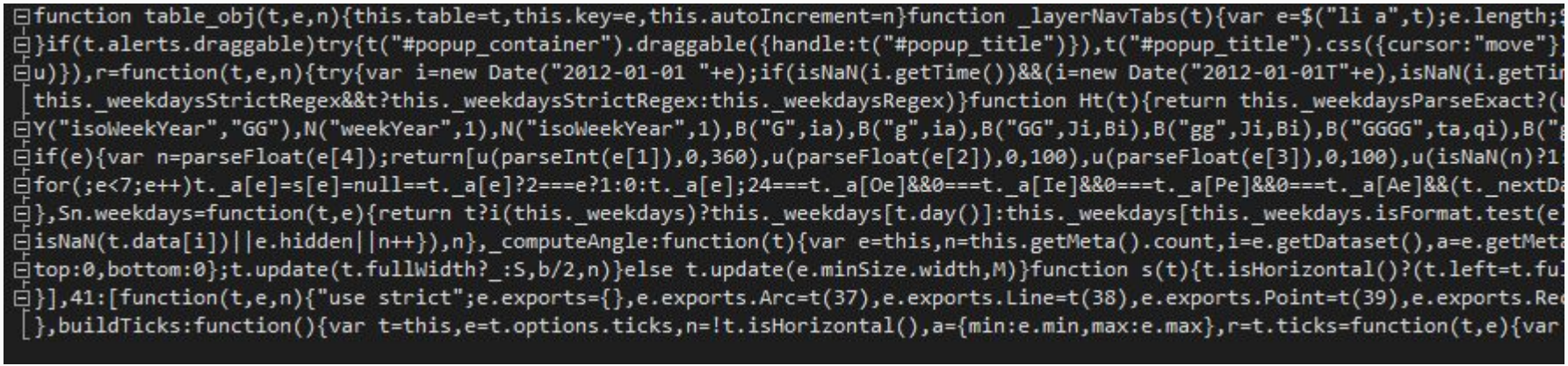
```
<!--<pre> {{mainCtrl.slides | json }}</pre>-->
<div class="row" style="font-weight:bold;margin-top:20px;">
  <div class="col-md-3">SlideName</div>
  <div class="col-md-3"> TinCanID</div>
  <div class="col-md-2"> StartTime</div>
  <div class="col-md-2"> EndTime</div>

</div>
<div class="row">
  <div class="col-md-3"><input type="text" class="form-control" ng-model="mainCtrl.newSlideName" /></div>
  <div class="col-md-3"><input type="text" class="form-control" ng-model="mainCtrl.newSlideTinCanID" /></div>
  <div class="col-md-2"> <input type="number" class="form-control" ng-model="mainCtrl.newStartTime" /></div>
  <div class="col-md-2">
      <input type="number" class="form-control" ng-model="mainCtrl.newEndTime" />
  </div>
  <div class="col-md-2">
      <div class="btn btn-default" ng-click="mainCtrl.addSlide()">Add</div>
  </div>
</div>
<div class="row" ng-repeat="slide in mainCtrl.slides" style="border-bottom:1px solid #e0e0e0;">
  <div class="col-md-3">{{slide.SlideName}}</div>
  <div class="col-md-3"> {{slide.SlideTinCanID}}</div>
  <div class="col-md-2"> {{slide.startTime}}</div>
  <div class="col-md-2"> {{slide.endTime}}</div>
  <div class="col-md-2"> <span class="glyphicon glyphicon-remove" style="color:red;" ng-click="mainCtrl.removeSlide($index)"></span></div>
</div>
</div>
```

```
$font-stack:    Helvetica, sans-serif;
$primary-color: #333;

body {
  font: 100% $font-stack;
  color: $primary-color;
}
```

Third Transition (continued)



Pros/Cons of this architecture

Pros:

- Angular directives are highly reusable
- Javascript is much more secure
- CSS is easier to work with
- Client side resources load more quickly

Cons:

- Javascript isn't debuggable without jsmaps
- Requires some sort of automated process (gulp) to compile down
- More setup for gulp, etc
- Node_modules on solution

Other Projects

- TMS App
- SSO
- LTI
- Tincan

TMS App

- IOS doesn’t allow a one time use code for logging in.
- Had to begin making all usernames across DBs unique
- Each database had to have a unique identifier (State Abbreviation)

SSO

- Using Microsoft ADFS to create a Single Sign On system
- Allows our system to connect to client’s directory
- Single username/password for user
- Pre-login if logged in to main directory site

LTI

- Learning Tools Interoperability
- Communication standard for allowing third party plugins
- Allows tools to send grade info back to the LMS

Tincan API

- API architecture that follows format of user “experienced” item
- Was used for content usage tracking on TMS
- Primarily designed for NoSQL database, reworked for a SQL database

Major Events

- Microsoft Azure SSL
- AWS downtimes
- Transition to new Architecture
- Microsoft Azure datacenter shutdown

Looking ahead

- Ionic
- AWS Lambda/Serverless
- NIST 800-53

Certifications/Continuing Education

There are many paths for security and infrastructure. Each goes in its own direction.

- AWS Certification
- Microsoft Certifications
- Cisco Certifications
- Safari Books Online(O'Reilly)

Conclusion/Take Aways

- IT is continually changing, so keep yourself very adaptable
- Never stop learning
- Always be ready for new challenges
- Use all resources available to you