E2E with Cypress

Buddy Hammond
Principal Programmer
Agenda

- SPA Tech Stack
- Cypress
- Business Driven Development
- Code Generation
- Data Driven Testing
- Performance HARs and K6
- Stats
SPA Tech Stack

- Tech stack
  - Java, JSP, Spring, JQuery, Oracle
  - Single Page Web App
  - Junit
  - VS Code
  - JRebel
BDD & Testing

• Business Analysts
  • Requirements, Specifications & Test Plans
  • Review & Approve after initial development
  • Limited regression testing which was manual

• Tests Definition in Excel Spreadsheets
  • Written in plain English – no special syntax (Gherkin)
  • Columns such as Precondition, Test Step, Expected Results
  • Row details Process
  • Provided to Users to manually test
<table>
<thead>
<tr>
<th>Test Scenario</th>
<th>Precondition</th>
<th>Test Steps</th>
<th>Test Data/Cases</th>
<th>Expected Results</th>
</tr>
</thead>
</table>
| 2 Create New Defendant for Case  | Valid user selects Enter a Case | Navigate to the Defendant section  
Enter Last Name  
Enter First Name  
Expand Demographics section  
Enter Date of Birth  
Expand Address section  
Enter Street Address  
Enter City  
Enter Zip Code  
Save Defendant | Green Noty stating Defendant Saved and Address | All Defendant info is grayed out  
Case details section is now enabled |
| 3                                |                             | Enter Arresting Agency ORI  
Enter Filing Date - Current System Date  
Move to Prosecuting Attorney of Record section  
Click to Add PA of Record  
Click Party Type drop down and select APA - Assistant Prosecuting Attorney  
In Prosecuting Attorney text field enter code and select name 42146, Nasreen Esmail Engle | M1  
MO0140800 | Add Additional Prosecuting Attorney of Record |
Cypress – what, why

- Modern web testing and automation
- NodeJS - Javascript
- Runs in browser alongside application
- Direct access to developer tools
- DOM & network & console
- Interact w/ elements on page same as developer
- Manage UI – auto scrolls, waits when hidden
- Wait on Network Requests
- Time Travel
Integrated debugger
Time Travel
## Cypress Report

### Dashboard

**Features**
- **Chart**: Total features: 30, 93.33% Passed, 6.67% Failed

**Scenarios**
- **Chart**: Total scenarios: 109, 95.41% Passed, 4.59% Failed

### Run Info

### Features overview

<table>
<thead>
<tr>
<th>Feature name</th>
<th>Status</th>
<th>Device</th>
<th>OS</th>
<th>Browser</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJ Close Two Future Events</td>
<td>⚠️</td>
<td>osca36848</td>
<td>10.0</td>
<td>118.0</td>
<td>00:08:37</td>
</tr>
<tr>
<td>DJ Happy Path</td>
<td>⚠️</td>
<td>osca36848</td>
<td>10.0</td>
<td>118.0</td>
<td>00:04:27</td>
</tr>
<tr>
<td>Add Docket Entry Build Process</td>
<td>⚠️</td>
<td>osca36848</td>
<td>10.0</td>
<td>118.0</td>
<td>00:02:46</td>
</tr>
<tr>
<td>Add Docket Entry Input Cases</td>
<td>⚠️</td>
<td>osca36848</td>
<td>10.0</td>
<td>118.0</td>
<td>00:03:33</td>
</tr>
</tbody>
</table>
Failed tests with screenshots
SMC Cypress Framework

• Code Generation
  • Actions – Stubbed functions
  • Steps, Features – No modification - regenerate
  • Fixtures – Data per Environment

• NodeJS scripts
  • Run Tests in Each Environment Daily
  • Each Pull Request
    • Build & Deploy SMC
    • Run Tests
  • Send reports
Code Generation

- BA Test Plan Spreadsheets
- Record of Truth
- Generate/Re Code
- Cypress BDD Framework controls Flow
- Developer implements empty functions
- Any change to Test
  - Update Spreadsheet
  - Regenerate Code
Data Driven Testing

• Scripts don’t know what Environment (5)
• Some data is random – e.g. Defendant bio
• Some data is static – e.g. Court, charge, plea
• Data is specific to Scenario and Environment
• Data used to generate Tests
5 Environments

Each environment is different Court

DEV
MV
TEST
UAT
TRN

Cypress Actions
Large Data Set per Service Class

| Court | Code | Agent | Atty | PAtty | ANm | ... | ..... | ... | ... | ...
|-------|------|-------|------|-------|-----|-----|-------|-----|-----|-----
| ABC   | ...  | ...   | ...  | ...   | ... | ... | ...   | ... | ... | ...
| DEF   | ...  | ...   | ...  | ...   | ... | ... | ...   | ... | ... | ...
| ...   | ...  | ...   | ...  | ...   |     | ... | ...   | ... | ... | ...

Cypress Service

Actions

Actions

Actions

Actions
Performance HARs & K6

• Scenario generates HAR
• HAR – HTTP Archive Format
• All network interaction – Request & Response
• Code processes HAR and generates K6
• Code manipulates K6 to built tests
• Small classes doing specific mods
• Soak, Load, Stress
HAR -> K6 Performance Generator
K6 Stats

- **Soak:** 5h 15m
- **Iterations:** ~13K
- **HTTP Reqs:** 9M

```
data_received: 443 GB  23 MB/s
data_sent: 9.2 GB  486 KB/s
http req_blocked: avg=33.34µs min=0µs med=0µs max=398.39ms p(90)=0µs p(95)=0µs
http req_connecting: avg=23.15µs min=0µs med=0µs max=246ms p(90)=0µs p(95)=0µs
http req_duration: avg=199.69ms min=0µs med=100.93ms max=1m0s p(90)=518.58ms p(95)=705.6ms
http req_failed: 0.14% √ 13664 X 9150788
http req_received: avg=7.25ms min=0µs med=0µs max=2.05s p(90)=4ms p(95)=34.52ms
http req_sending: avg=82.04µs min=0µs med=0µs max=373.56ms p(90)=0µs p(95)=0µs
http req_tls_handshaking: avg=0µs min=0µs med=0µs max=0µs p(90)=0µs p(95)=0µs
http req_waiting: avg=192.35ms min=0µs med=95.99ms max=1m0s p(90)=499.99ms p(95)=682.14ms
http reqs: 9164452 484.112248/s
iteration_duration: avg=2m22s min=8.91s med=2m20s max=6m34s p(90)=2m42s p(95)=2m51s
iterations: 12927 0.682869/s
vus: 68 min=1 max=100
vus_max: 100 min=100 max=100
```
JVM
Classic Sawtooth Garbage collection
Stats as of Sept 2023

- 3 full time
- 5 full stack
- 30 Features
- 96 Scenarios
- 5 Environments daily
- ~200 PRs for month
- Avg Runtime: 1 hour 10 minutes
- 6 PR Servers
THANKS!