

SYNTHETIC MONITORING AND E2E TESTING 2 SIDES OF THE SAME COIN

CARLY RICHMOND

ABOUT ME

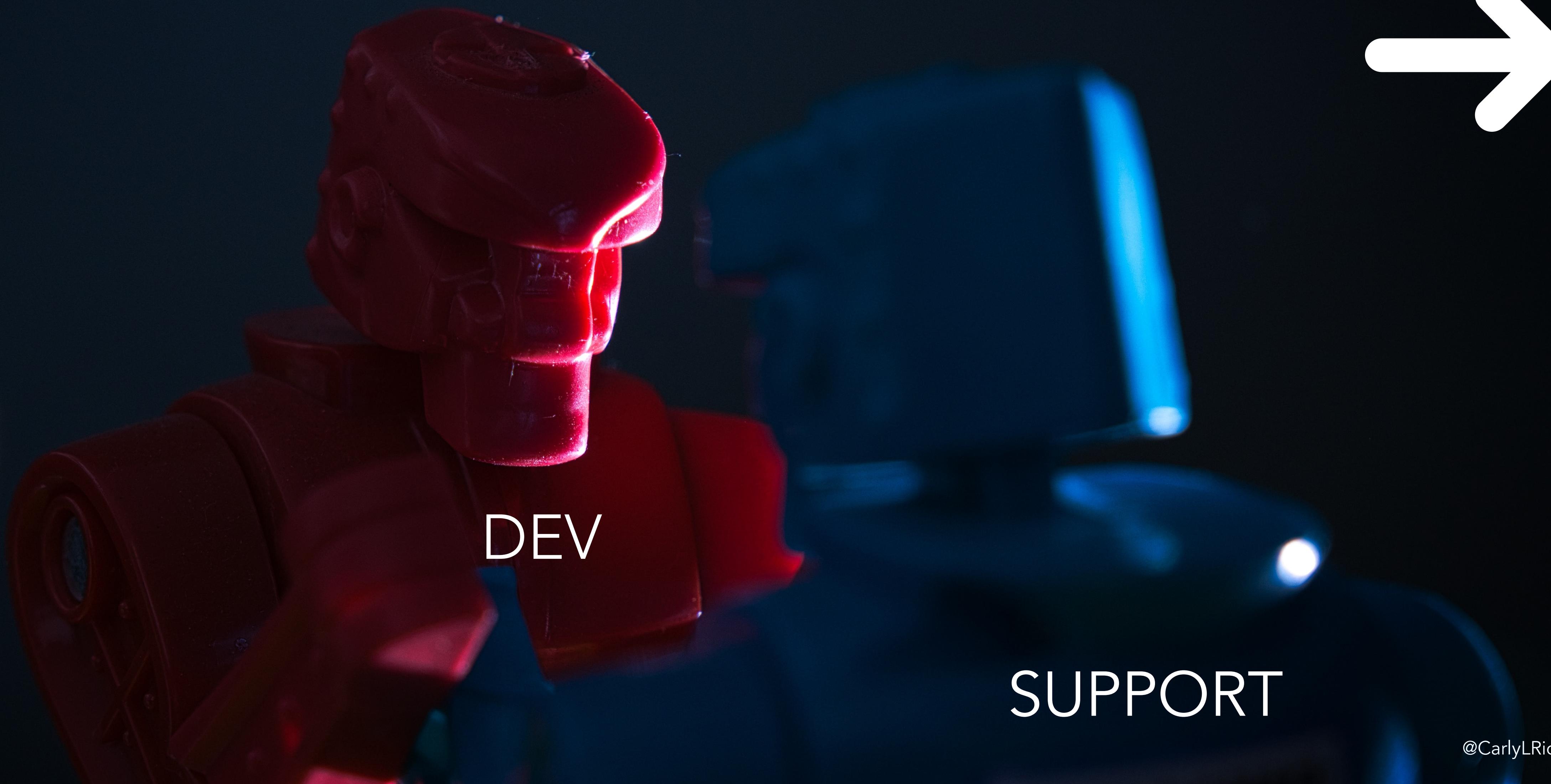
- Developer Advocate & Manager @ Elastic
- Frontend Engineer, Speaker & Blogger



2011







2025









DON'T
^
WIFIE FEAR YOU.





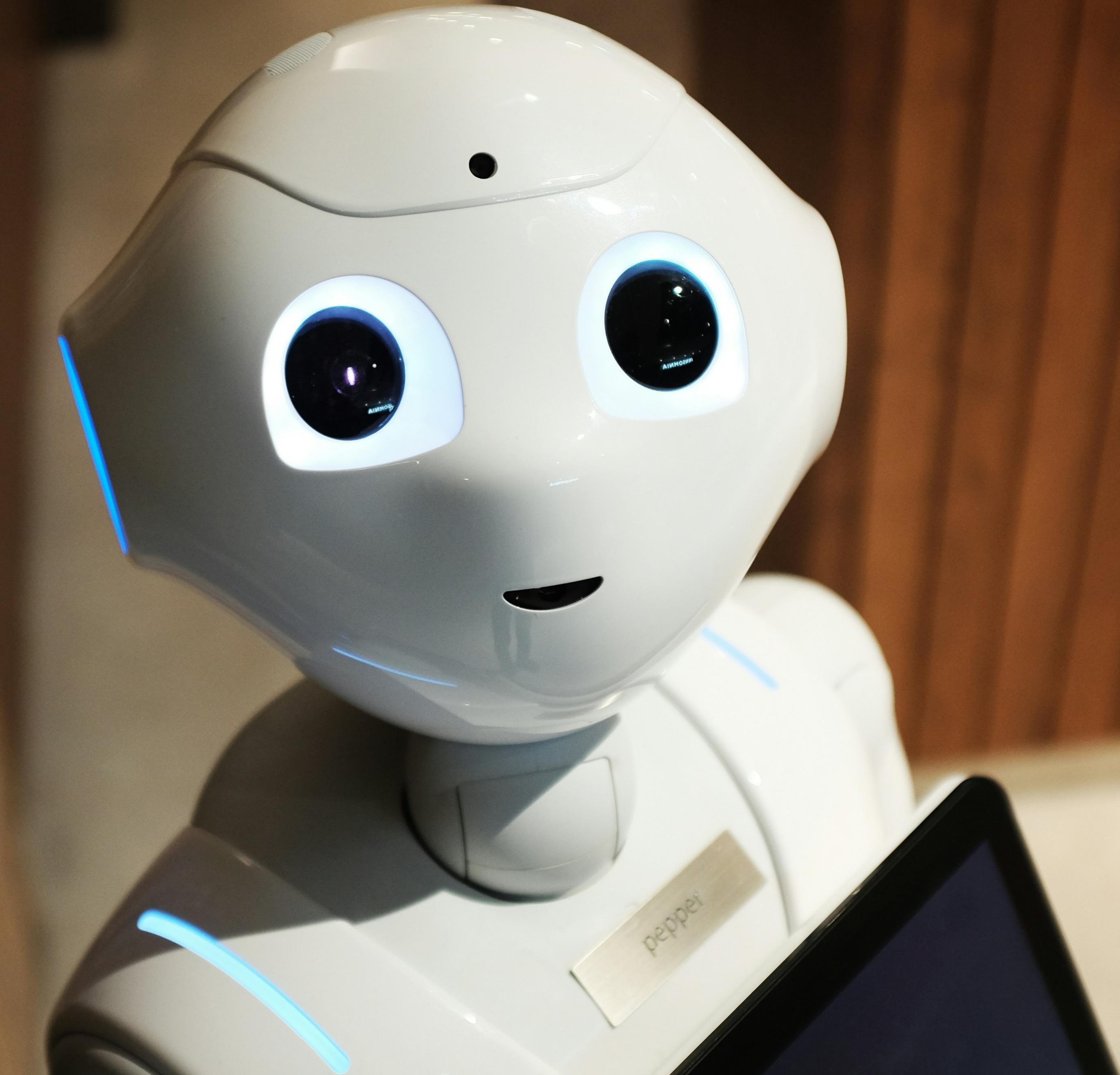




E2E Testing

Synthetic
Monitoring

USER





heartbeat.yml

```
1 heartbeat.monitors:  
2 - type: http  
3   name: Replicator HTTP ping  
4   id: synthetics-replicator-monitor-http  
5   enabled: true  
6   urls: "https://synthetics-replicator.netlify.app/"  
7   schedule: '@every 3m'  
8   timeout: 16s
```

USER

MONITORING AS CODE



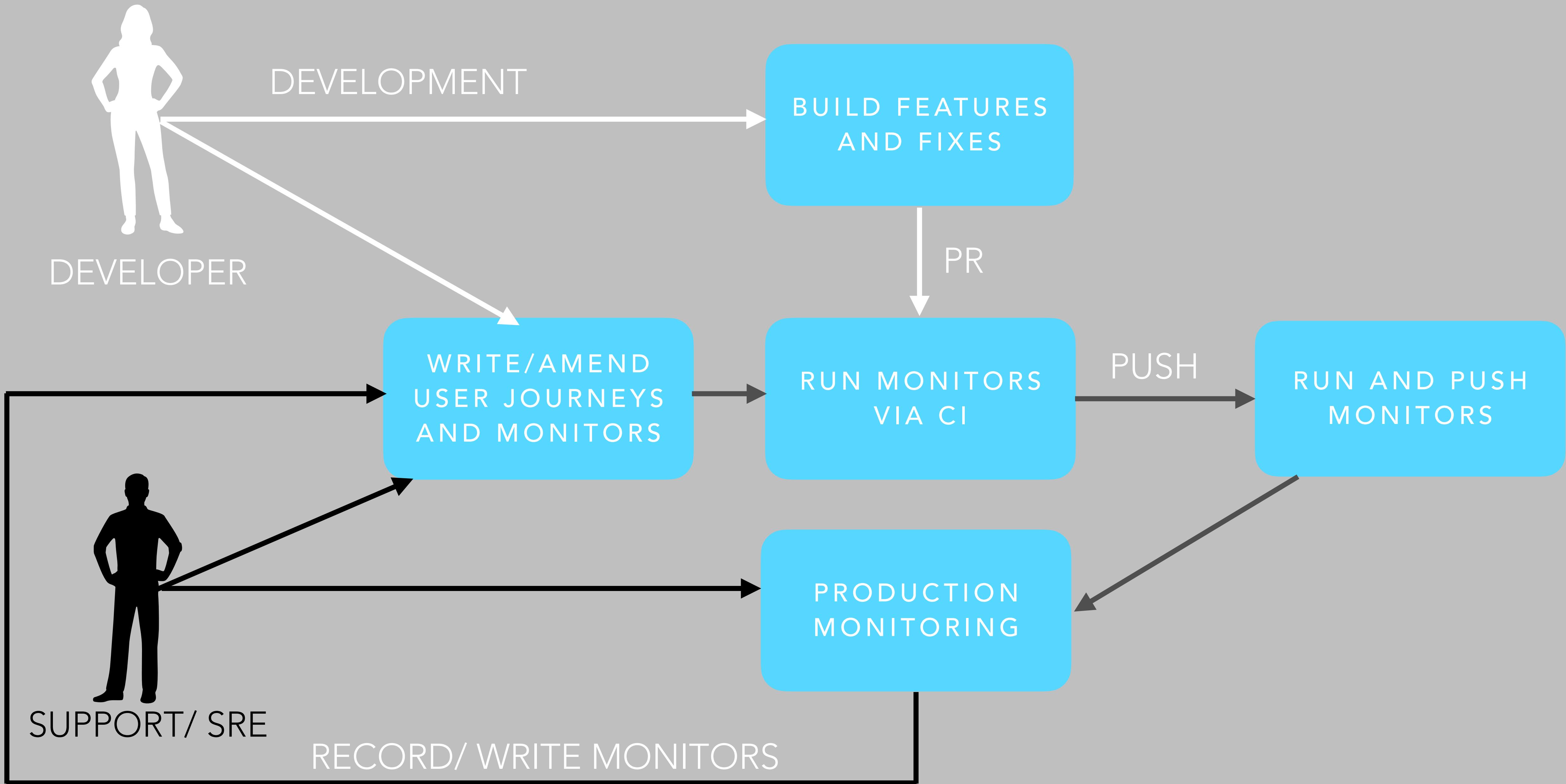
```
Atom File Edit View Selection Find Packages Window Help
Servers.js — ~/Documents/Personal-Projects/minecraftPeServersApp
Project
minecraftPeServersApp
  __tests__
  .git
  android
  app
    assets
    components
    config
    screens
      About.js
      Favorites.js
      FilterServers.js
      News.js
      Server.js
      Servers.js
      Submit.js
      Tutorial.js
    utilities
    .DS_Store
    index.js
  ios
  node_modules
  PSD
app/screens/Servers.js ① 9 ▲ 0 0 0 18:12
  • LF  UTF-8 Java
1 import React, { Component } from 'react';
2 import {
3   TouchableHighlight,
4   RefreshControl,
5   Platform,
6   AppState
7 } from 'react-native';
8 import { Toast, Card, CardItem, Container,
9   Col, Grid } from 'react-native-elements';
10 import Icon from 'react-native-vector-icon';
11 var _ = require('lodash');
12 import firebase from 'react-native-firebase';
13
14 import ServerComp from '../components/ServerComp';
15 import Data from '../utilities/Data';
16 import Cache from '../utilities/Cache';
17
18 /* Admob */
19 const advert = firebase.admob().interstitial();
20 const AdRequest = firebase.admob.AdRequest();
21 const request = new AdRequest();
22
23 export default class Servers extends Component {
24   constructor(props) {

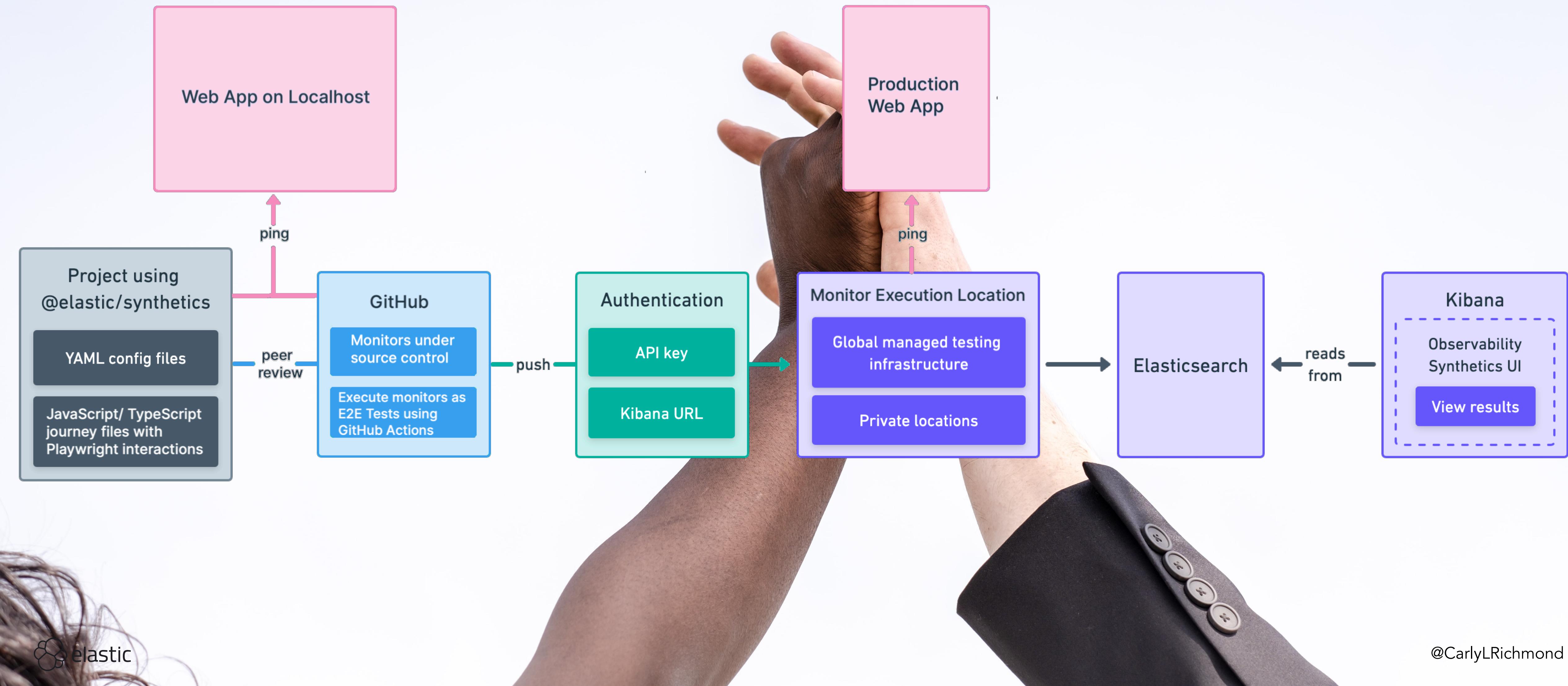
```

USER



CLICK ME!







Login

To seek out new food and new cuisines.
To boldly eat what no one has eaten before!

Order Now!





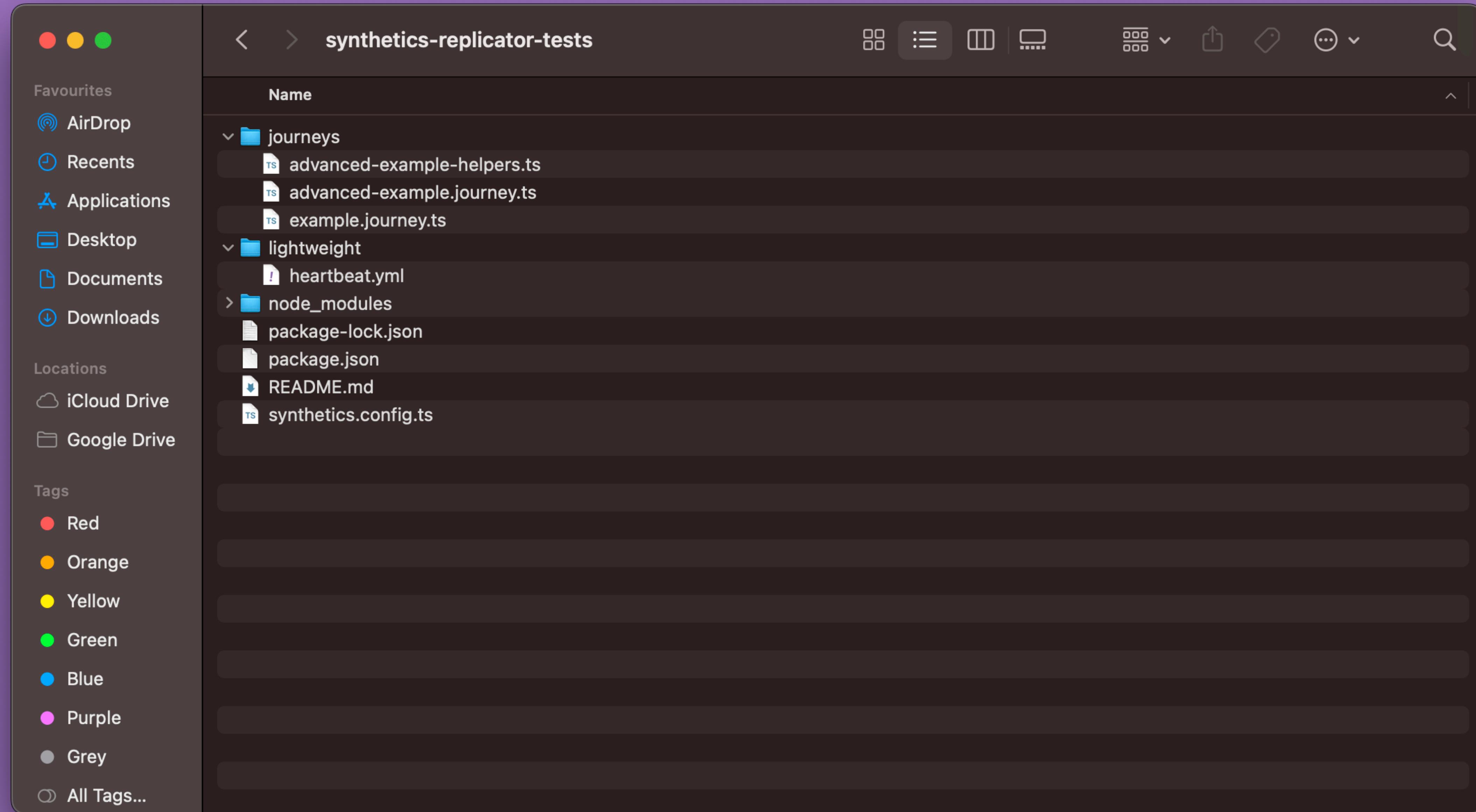
```
1 import { test, expect } from '@playwright/test';
2
3 test('assert manual login successful', async ({ page }) => {
4   await page.goto('/login');
5
6   const loginForm = await page.getByTestId('login-form');
7   expect(loginForm).toBeDefined();
8
9   // Check submit button is disabled before entry
10  const submitButton = await page.getByTestId('login-button');
11  expect(submitButton).toBeDisabled();
12
13  // Add credentials
14  const username = 'me@me.com';
15  const usernameInput = page.getByTestId('username-input');
16  usernameInput.fill(username)
17  await expect(usernameInput).toHaveValue(username);
18
19  const password = 'password';
20  const passwordInput = page.getByTestId('password-input');
21  passwordInput.fill(password)
22  await expect(passwordInput).toHaveValue(password);
23
24  // Check login button is now enabled
25  expect(submitButton).toBeEnabled();
26  await submitButton.click();
27
28  // Wait for login
29  await page.waitForURL('**/order');
30
31  // Validate we have logged in successfully
32  const loginButton = await page.getByTestId('account-button')
33  expect(loginButton).toContainText('Welcome');
34});
```





synthetics-replicator - -zsh

```
> npm install -g @elastic/synthetics
> npx @elastic/synthetics -h
> npx @elastic/synthetics init synthetics-replicator-
test
```





```
1 import { SyntheticsConfig } from '@elastic/synthetics';
2 import { devices } from "playwright-chromium";
3
4 export default env => {
5   const config: SyntheticsConfig = {
6     params: {
7       url: 'http://localhost:5173',
8       username: process.env.REPLICATR_USERNAME,
9       password: process.env.REPLICATR_PASSWORD,
10      isLocal: env !== 'production'
11    },
12    playwrightOptions: {
13      ignoreHTTPSErrors: false,
14      ...devices[ 'Desktop Chrome' ]
15    },
16    /**
17     * Configure global monitor settings
18     */
19    monitor: {
20      schedule: 10,
21      locations: [ 'united_kingdom' ],
22      privateLocations: []
23    },
24    /**
25     * Project monitors settings
26     */
27    project: {
28      id: 'synthetics-replicator-tests',
29      url: 'https://my-elastic-deployment:443',
30      space: 'default',
31    },
32  };
33
34  if (env === 'production') {
35    config.params!.url = 'https://synthetics-replicator.netlify.app/';
36  }
37  return config;
38};
```



login.journey.ts

```
1 import { journey, step, monitor, expect, before } from '@elastic/synthetics';
2
3 journey('Replicator Login Journey', ({ page, params }) => {
4
5   // Only relevant for the push command to create
6   // monitors in Kibana
7   monitor.use({
8     id: 'synthetics-replicator-monitor-login',
9     schedule: 20,
10    });
11
12  before(async () => {
13    await page.goto(params.url);
14  });
15
16  step('assert home page loads', async () => {
17    const header = await page.locator('h1');
18    expect(await header.textContent()).toBe('Replicatr');
19  });
20
21  step('assert go to login page', async () => {
22    const loginButton = await page.getByTestId('account-button');
23    expect(loginButton).toHaveText('Login');
24    await loginButton.click();
25
26    const url = page.url();
27    expect(url).toContain('/login');
28
29    const loginForm = await page.getByTestId('login-form');
30    expect(loginForm).toBeDefined();
31  });
32
33  step('assert manual login successful', async () => {
34    const loginForm = await page.getByTestId('login-form');
35    expect(loginForm).toBeDefined();
36
37    // Check submit button is disabled before entry
38    const submitButton = await page.getByTestId('login-button');
39    expect(submitButton).toBeDisabled();
40
41    // Add credentials
42    const username = params.username;
43    const usernameInput = page.getByTestId('username-input');
44    usernameInput.fill(username);
45    await expect(usernameInput).toHaveValue(username);
46
47    const password = params.password;
48    const passwordInput = page.getByTestId('password-input');
49    passwordInput.fill(password);
50    await expect(passwordInput).toHaveValue(password);
51
52    // Check login button is now enabled
53    expect(submitButton).toBeEnabled();
54    await submitButton.click();
55
56    // Wait for login
57    await page.waitForURL('**/order');
58
59    // Validate we have logged in successfully
60    const loginButton = await page.getByTestId('account-button');
61    expect(loginButton).toContainText('Welcome');
62
63    // Ensure we have navigated to menu
64    const menuTiles = await page.getByTestId('menu-item-card');
65    expect(await menuTiles.count()).toBeGreaterThan(0);
66  });
67});
```



login.journey.ts

```
1 import { journey, step, monitor, expect, before } from '@elastic/synthetics';
2
3 journey('Replicator Login Journey', ({ page, params }) => {
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40
41   // Add credentials
42   const username = params.username;
```

```
41 // Add credentials
42 const username = params.username;
43 const usernameInput = page.getByTestId('username-input');
44 usernameInput.fill(username);
45 await expect(usernameInput).toHaveValue(username);
46
47 const password = params.password;
48 const passwordInput = page.getByTestId('password-input');
49 passwordInput.fill(password);
50 await expect(passwordInput).toHaveValue(password);
51
52 // Check login button is now enabled
53 expect(submitButton).toBeEnabled();
54 await submitButton.click();
55
56 // Wait for login
57 await page.waitForURL('**/order');
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59 // Validate we have logged in successfully
60 const loginButton = await page.getByTestId('account-button');
61 expect(loginButton).toContainText('Welcome');
```

```
47 const password = params.password;
48 const passwordInput = page.getByTestId('password-input');
49 passwordInput.fill(password);
50 await expect(passwordInput).toHaveValue(password);
51
52 // Check login button is now enabled
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65 expect(await menuTiles.count()).toBeGreaterThan(0);
66 });
67 );
```

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56    // Wait for login
57    await page.waitForURL('**/order');
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59    // Validate we have logged in successfully
60    const loginButton = await page.getByTestId('account-button');
61    expect(loginButton).toContainText('Welcome');
62
63    // Ensure we have navigated to menu
64    const menuTiles = await page.getByTestId('menu-item-card');
65    expect(await menuTiles.count()).toBeGreaterThan(0);
66  });
67});
```



synthetics-replicator — zsh — 129x37

```
[carly.richmond@MacBookPro synthetics-replicator % npm run test
```

```
> synthetics-replicator@0.0.0 test
> cd apps/synthetics-replicator-tests && npm run test
```

```
> synthetics-replicator-tests@1.0.0 test
> npx @elastic/synthetics journeys
```

Journey: Local Replicator Order Journey

- ✓ Step: 'assert home page loads' succeeded (65 ms)
- ✓ Step: 'assert move to order page' succeeded (268 ms)
- ✓ Step: 'assert adding to order' succeeded (232 ms)

Journey: Recorded Order journey

- ✓ Step: 'Go to order items page' succeeded (383 ms)
- ✓ Step: 'Add item to cart successfully' succeeded (83 ms)
- ✓ Step: 'Add 2nd item to cart successfully' succeeded (66 ms)
- ✓ Step: 'Add 3rd item to cart successfully' succeeded (67 ms)

Journey: Replicator Order Journey

- ✓ Step: 'assert home page loads' succeeded (48 ms)
- ✓ Step: 'assert move to order page' succeeded (580 ms)
- ✓ Step: 'assert adding to order' succeeded (597 ms)

Journey: Replicator Login Journey

- ✓ Step: 'assert home page loads' succeeded (71 ms)
- ✓ Step: 'assert go to login page' succeeded (141 ms)
- ✓ Step: 'assert manual login successful' succeeded (633 ms)
- ✓ Step: 'assert unable to go to login page when signed in' succeeded (197 ms)

```
14 passed (5853 ms)
```

```
carly.richmond@MacBookPro synthetics-replicator %
```





```
1 name: Push Workflow- Elastic Synthetics With Svelte Replicator
2 on:
3   push:
4     branches: [main, master]
5 jobs:
6   test:
7     env:
8       NODE_ENV: development
9       REPLICATR_USERNAME: ${{ secrets.REPLICATR_USERNAME }}
10      REPLICATR_PASSWORD: ${{ secrets.REPLICATR_PASSWORD }}
11      SYNTHETICS_JUNIT_FILE: junit-synthetics.xml
12    runs-on: ubuntu-latest
13    steps:
14      - uses: actions/checkout@v3
15      - uses: actions/setup-node@v3
16        with:
17          node-version: 18
18      - run: npm ci
19      - run: npm start &
20      - run: "npm install @elastic/synthetics && npx @elastic/synthetics . --reporter=junit"
21        working-directory: ./apps/synthetics-replicator-tests/journeys
22      - name: Publish Unit Test Results
23        uses: EnricoMi/publish-unit-test-result-action@v2
24        if: always()
25        with:
26          junit_files: '**/junit-*.xml'
27          check_name: Elastic Synthetics Tests
28 push:
29   env:
30     NODE_ENV: production
31     REPLICATR_USERNAME: ${{ secrets.REPLICATR_USERNAME }}
32     REPLICATR_PASSWORD: ${{ secrets.REPLICATR_PASSWORD }}
33     SYNTHETICS_API_KEY: ${{ secrets.SYNTHETICS_API_KEY }}
34 needs: test
35 defaults:
36   run:
37     working-directory: ./apps/synthetics-replicator-tests
38 runs-on: ubuntu-latest
39 steps:
40   - uses: actions/checkout@v3
41   - uses: actions/setup-node@v3
42     with:
43       node-version: 18
44   - run: npm ci
45   - run: npm run push
```



```
5 jobs:
6   test:
7     env:
8       NODE_ENV: development
9       REPLICATR_USERNAME: ${{ secrets.REPLICATR_USERNAME }}
10      REPLICATR_PASSWORD: ${{ secrets.REPLICATR_PASSWORD }}
11      SYNTHETICS_JUNIT_FILE: junit-synthetics.xml
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14   - uses: actions/checkout@v3
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28 push:
29   env:
30     NODE_ENV: production
```





```
1 name: Push Workflow- Elastic Synthetics With Svelte Replicator
2 on:
3   push:
4     branches: [main, master]
5 jobs:
6   test:
7     env:
8       NODE_ENV: development
9       REPLICATR_USERNAME: ${{ secrets.REPLICATR_USERNAME }}
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24        if: always()
25        with:
26          junit_files: '**/junit-*.xml'
27          check_name: Elastic Synthetics Tests
28 push:
29   env:
30     NODE_ENV: production
31     REPLICATR_USERNAME: ${{ secrets.REPLICATR_USERNAME }}
32     REPLICATR_PASSWORD: ${{ secrets.REPLICATR_PASSWORD }}
33     SYNTHETICS_API_KEY: ${{ secrets.SYNTHETICS_API_KEY }}
34 needs: test
35 defaults:
36   run:
37     working-directory: ./apps/synthetics-replicator-tests
38 runs-on: ubuntu-latest
39 steps:
40   - uses: actions/checkout@v3
41   - uses: actions/setup-node@v3
42     with:
43       node-version: 18
44   - run: npm ci
45   - run: npm run push
```





main

73d0aff

- ✓ Push Workflow- Elastic Syntheti... 1
on: push

✓ test

✓ push

✓ Elastic Synthetics Tests

GitHub Actions / Elastic Synthetics Tests

succeeded 2 minutes ago in 0s

All 14 tests pass in 2s

14 tests +14 14 ✓ +14 2s ⏱ +2s
4 suites + 4 0 ↕ ± 0
1 files + 1 0 ✗ ± 0

Results for commit [73d0aff](#). ± Comparison against earlier commit [03d2e72](#).

ANNOTATIONS

ⓘ Check notice on line 0 in .github [🔗](#)

/github-actions / Elastic Synthetics Tests

14 tests found

There are 14 tests, see "Raw output" for the full list of tests.

[Raw output](#)

```
Local Replicator Order Journey assert adding to order - assert adding to order
Local Replicator Order Journey assert home page loads - assert home page loads
Local Replicator Order Journey assert move to order page - assert move to order page
Recorded Order journey Add 2nd item to cart successfully - Add 2nd item to cart successfully
Recorded Order journey Add 3rd item to cart successfully - Add 3rd item to cart successfully
Recorded Order journey Add item to cart successfully - Add item to cart successfully
Recorded Order journey Go to order items page - Go to order items page
Replicator Login Journey assert go to login page - assert go to login page
Replicator Login Journey assert home page loads - assert home page loads
Replicator Login Journey assert manual login successful - assert manual login successful
Replicator Login Journey assert unable to go to login page when signed in - assert unable to go to login page when signed in
Replicator Order Journey assert adding to order - assert adding to order
Replicator Order Journey assert home page loads - assert home page loads
Replicator Order Journey assert move to order page - assert move to order page
```



main

73d0aff

Re-run all jobs

- ✓ Push Workflow- Elastic Syntheti... 1
on: push

✓ test

✓ push

✓ Elastic Synthetics Tests

GitHub Actions / Elastic Synthetics Tests

succeeded 2 minutes ago in 0s

All 14 tests pass in 2s

14 tests +14 14 ✓ +14 2s ⏱ +2s
4 suites + 4 0 ↕ ± 0
1 files + 1 0 ✗ ± 0

Results for commit [73d0aff](#). ± Comparison against earlier commit [03d2e72](#).

ANNOTATIONS

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/github-actions / Elastic Synthetics Tests

14 tests found

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```
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2 on:
3   push:
4     branches: [main, master]
5 jobs:
6   test:
7     env:
8       NODE_ENV: development
9       REPLICATR_USERNAME: ${{ secrets.REPLICATR_USERNAME }}
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33     SYNTHETICS_API_KEY: ${{ secrets.SYNTHETICS_API_KEY }}
34 needs: test
35 defaults:
36   run:
37     working-directory: ./apps/synthetics-replicator-tests
38 runs-on: ubuntu-latest
39 steps:
40   - uses: actions/checkout@v3
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6   test:
7     env:
8       NODE_ENV: development
9       REPLICATR_USERNAME: ${{ secrets.REPLICATR_USERNAME }}
10      REPLICATR_PASSWORD: ${{ secrets.REPLICATR_PASSWORD }}
11      SYNTHETICS_JUNIT_FILE: junit-synthetics.xml
12    runs-on: ubuntu-latest
13    steps:
14      - uses: actions/checkout@v3
15      - uses: actions/setup-node@v3
16        with:
17          node-version: 18
18      - run: npm ci
19      - run: npm start &
20      - run: "npm install @elastic/synthetics && npx @elastic/synthetics . --reporter=junit"
21        working-directory: ./apps/synthetics-replicator-tests/journeys
22      - name: Publish Unit Test Results
23        uses: EnricoMi/publish-unit-test-result-action@v2
24        if: always()
25        with:
26          junit_files: '**/junit-*.xml'
27          check_name: Elastic Synthetics Tests
28 push:
29   env:
30     NODE_ENV: production
31     REPLICATR_USERNAME: ${{ secrets.REPLICATR_USERNAME }}
32     REPLICATR_PASSWORD: ${{ secrets.REPLICATR_PASSWORD }}
33     SYNTHETICS_API_KEY: ${{ secrets.SYNTHETICS_API_KEY }}
34 needs: test
35 defaults:
36   run:
37     working-directory: ./apps/synthetics-replicator-tests
38 runs-on: ubuntu-latest
39 steps:
40   - uses: actions/checkout@v3
41   - uses: actions/setup-node@v3
42     with:
43       node-version: 18
44   - run: npm ci
45   - run: npm run push
```





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+ Create Monitor

⟳ Refresh

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Search by name, URL, host, tag, project or I

Up

Down

Disabled

Type

2

Location

1

Tags

0

Frequency

5

Project

2

Current status

6

2

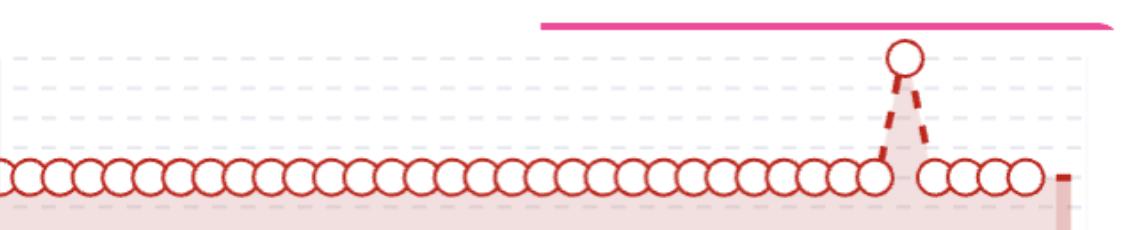
1

Up Down Disabled

Last 6 hours

3

Errors



Last 12 hours

2

Alerts



Showing 9 Monitors

Sort by Status

Group by Project

synthetics-replicator-tests

5 Monitors

Local Replicator Order Journey

Europe - United Kingdom

Duration

3 s

Recorded Order journey

Europe - United Kingdom

Duration

2 s

Replicator HTTP ping

Europe - United Kingdom

Duration

64 ms

Replicator Login Journey

Europe - United Kingdom



Duration

2 s

Replicator Order Journey

Europe - United Kingdom



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Up Down Disabled

Current status

6 Up
2 Down
1 Disabled

Last 6 hours

3 Errors

Showing 9 Monitors

synthetics-replicator-tests

Local Replicator Order Journey

Europe - United Kingdom

Duration ?

3 s

Recorded Order journey

Europe - United Kingdom

Duration ?

2 s

Replicator Order Journey

Europe - United Kingdom

Duration ?

2 s

Replicator Login Journey

Status

Succeeded

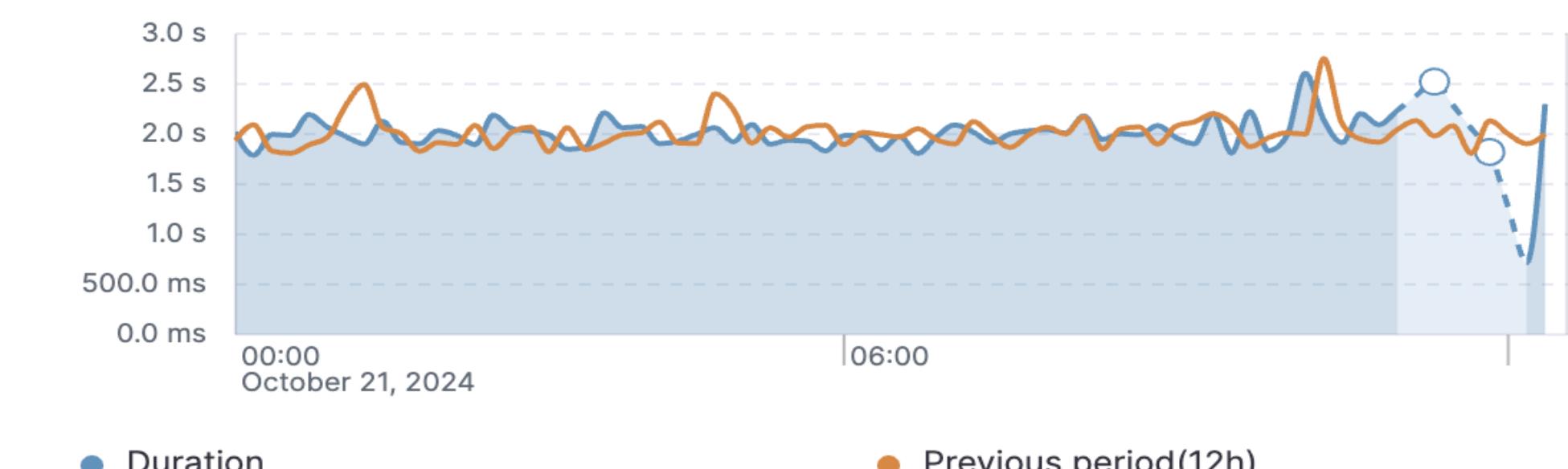
Location

Europe - United Kingdom

Enabled (all locations)



Duration



Monitor details

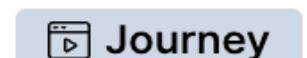
URL <https://synthetics-replicator.netlify.app/>

Last run Oct 21, 2024 @ 1:09:24 PM

Last modified Oct 21, 2024 @ 1:08:11 PM

Project ID synthetics-replicator-tests

Monitor ID synthetics-replicator-monitor-login-synthetics-replicator-tests-default



Journey

Frequency Every 30 minutes



Locations Europe - United Kingdom

--

Tags

Close

Go to monitor →



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< Replicator Login Journey

Test run details

Location

Europe - United Kingdom

Status

Failed

Date

Oct 21, 2024 @ 1:09:24 PM

⚠ Error running test

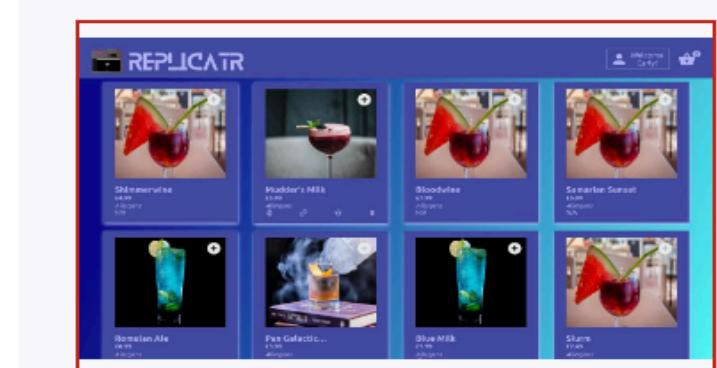
error executing step: expect(received).toBeGreaterThan(expected)

Step 3 of 4

< Previous

3 / 4

Next >



Step name

assert manual login successful

Failed

After 1.1 sec

⚠ View error details

View performance breakdown

Stacktrace

Code executed

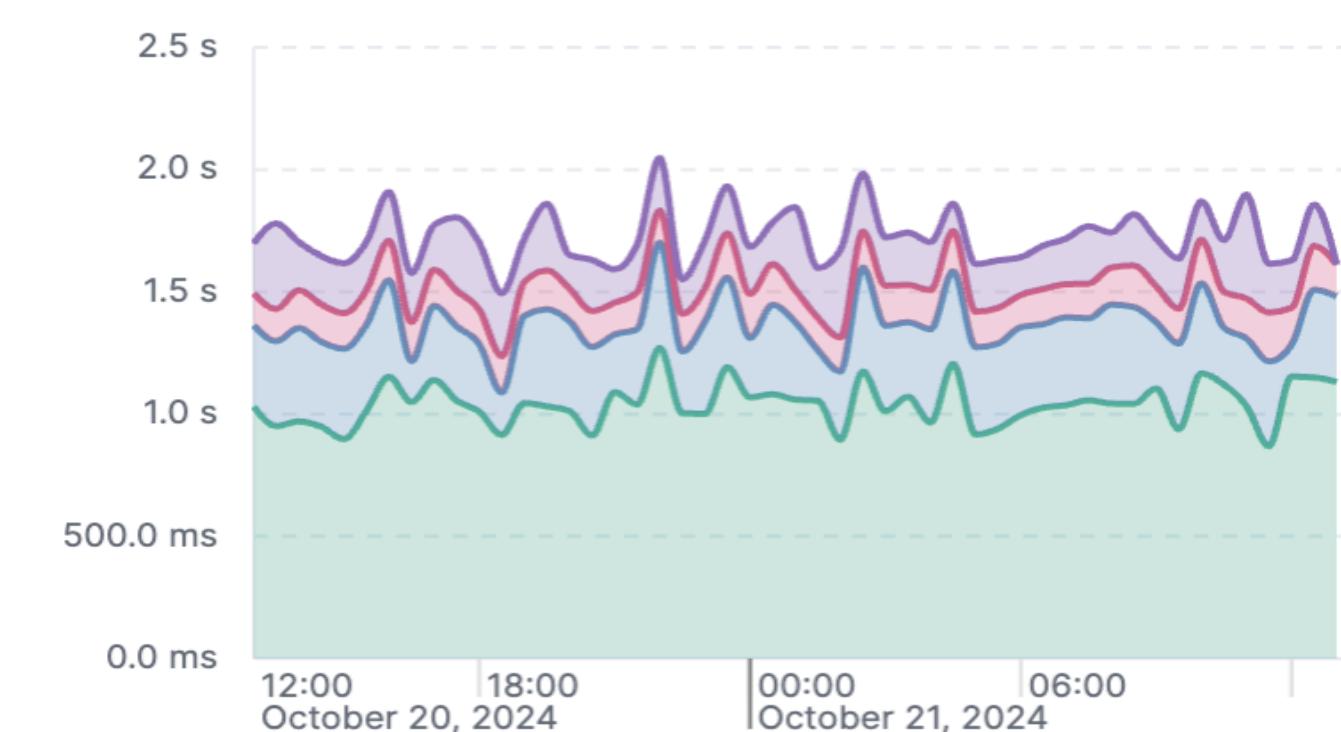
Console

Error: expect(received).toBeGreaterThan(expected)

Expected: > 100

Received: 23

Duration by step Last 24 hours



● assert manual login successful

● assert home page loads

Steps executed

Total duration: 1.6 sec



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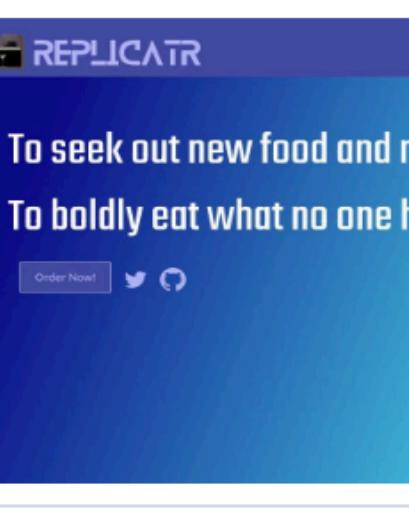
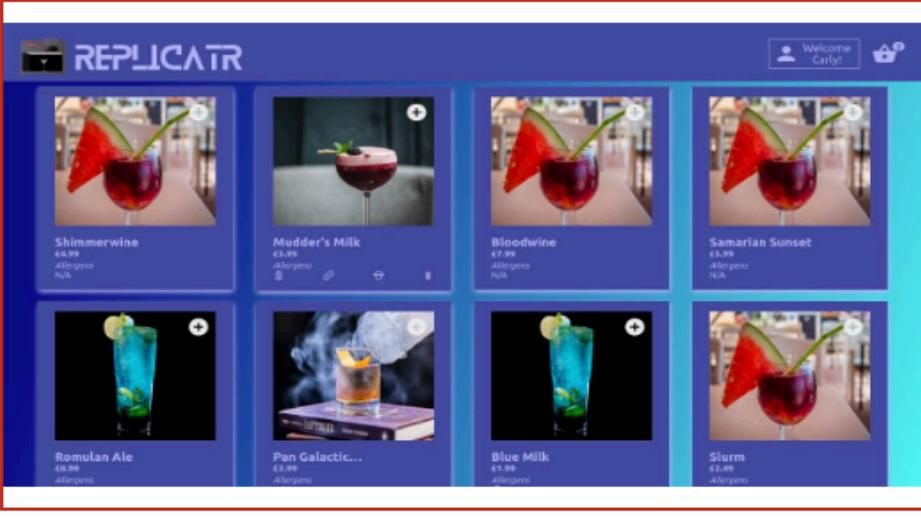
TLS Certificates

User Experience

assert home page loads Complete after 349 ms 359 ms

assert go to login page Complete after 130 ms 179 ms

assert manual login success ful Failed after 1.13 s 1.15 s



Blocked	32 ms ↑	Blocked	33 ms
DNS	-- ↑	DNS	--
Connect	-- ↑	Connect	--
TLS	-- --	TLS	--
Wait	1.10 s ↓	Wait	2.04 s
Receive	1.95 s ↑	Receive	587 ms
Send	0 ms —	Send	0 ms
Step duration	1.1 s ↑	Step duration	1.2
LCP	0 ms —	LCP	0 m
FCP	0 ms —	FCP	0 m
CLS	0 —	CLS	

Monitor details

URL	https://synthetics-replicator.netlify.app/
Last run	Oct 21, 2024 @ 1:09:24 PM
Last modified	Oct 21, 2024 @ 1:08:11 PM
Project ID	synthetics-replicator-tests
Monitor ID	synthetics-replicator-monitor-login-synthetics-replicator-tests-default
Monitor type	Journey
Frequency	Every 30 minutes
Tags	--



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Add data



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Rules Logs

Search

Rule s

● Succeeded: 4 ● Failed: 0 ● Warning: 0

4 rules

<input type="checkbox"/>	Name ↑	Last run ⓘ	Notifi
<input type="checkbox"/>	monitors-alive-check Uptime monitor status	Oct 18, 2024 16:09:06pm 4 minutes ago	
<input type="checkbox"/>	Replicator Order Journey(Simple status alert) Uptime monitor status	Oct 18, 2024 16:12:18pm 29 seconds ago	
<input type="checkbox"/>	Synthetics internal alert Synthetics monitor status	Oct 18, 2024 16:12:18pm 29 seconds ago	
<input type="checkbox"/>	Synthetics internal TLS alert Synthetics TLS certificate	Oct 18, 2024 16:12:18pm 29 seconds ago	

Rows per page: 10 ▾

Create rule

Name

Synthetic Monitor Alert

Tags

Optional

Synthetics monitor status

Alert when a monitor is down. [Learn more ↗](#)

Manage synthetics monitor status rule actions.

Check every ⓘ 5

minutes

▼

Advanced options

Alert after ⓘ 5

consecutive matches

Cancel

Show API request

✓ Save





COME
TOGE
THER



CLICK ME!

RESOURCES

- <https://ela.st/synthetics-replicator>
- <https://ela.st/synthetics-replicator-blog>
- <https://ela.st/synthetics-auth-advent>
- <https://www.usenix.org/publications/loginonline/synthetic-monitoring-e2e-testing-two-sides-same-coin>
- <https://semaphoreci.com/blog/synthetic-monitoring>



DANKE !
THANK YOU !
MERCI !
GRAZIE !
GRACIAS !
DANK JE WEL !



CLICK ME!