Automated Regression Testing for USA.gov

General Services Administration

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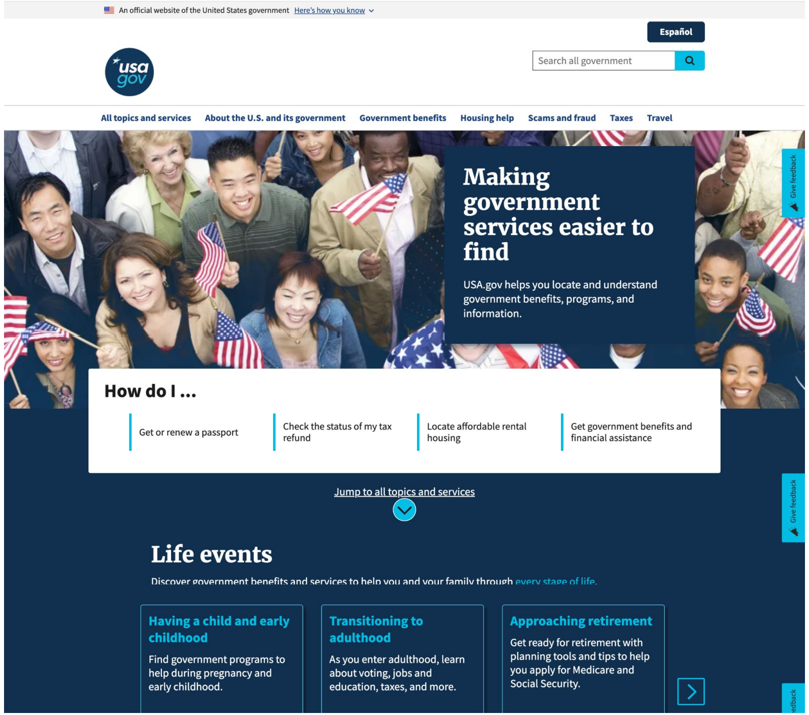
PROJECT BACKGROUND

What is USA.gov?



An official website of the United States government Here's how you know

Español

Search all government

All topics and services | About the U.S. and its government | Government benefits | Housing help | Scams and fraud | Taxes | Travel

Making government services easier to find

USA.gov helps you locate and understand government benefits, programs, and information.

How do I ...

- Get or renew a passport
- Check the status of my tax refund
- Locate affordable rental housing
- Get government benefits and financial assistance

Jump to all topics and services

Life events

Discover government benefits and services to help you and your family through every stage of life.

Having a child and early childhood
Find government programs to help during pregnancy and early childhood.

Transitioning to adulthood
As you enter adulthood, learn about voting, jobs and education, taxes, and more.

Approaching retirement
Get ready for retirement with planning tools and tips to help you apply for Medicare and Social Security.

Usa.gov Homepage

- Part of the PX Portfolio
- Aggregates information across federal programs and services
- Trusted source of user-centered government content
- Accessible, seamless, and centralized user experience when interacting with the government

PROJECT BACKGROUND

Regression Testing

Introduction

Definition

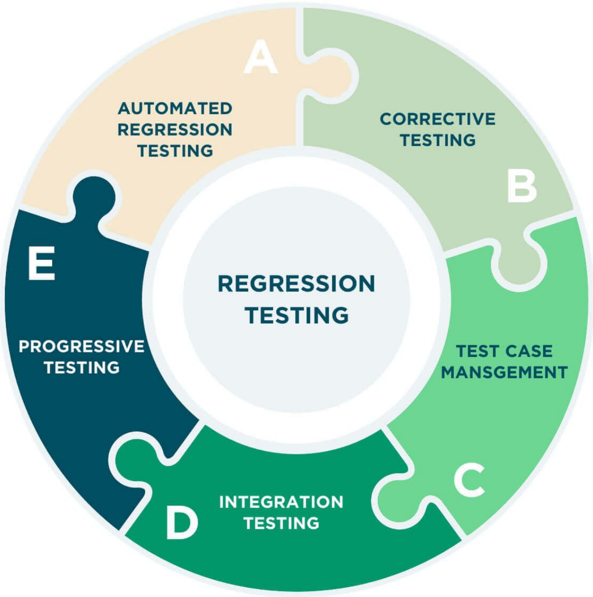
- Running of functional and non-functional tests

Current Procedure

- Full regression test takes about 2-4 hours of manual work

Motivating Factor

- Reliability due to the manual effort
- Certain tests are bound to get missed



PROJECT BACKGROUND

Automated Testing

Benefits

Reliability

- Standardized process
- Can easily repeat test cases

Reduces time and effort

- Eliminates need for human effort
- Will receive near immediate feedback

Scalability

- Maintain the same application quality and test coverage as the project grows

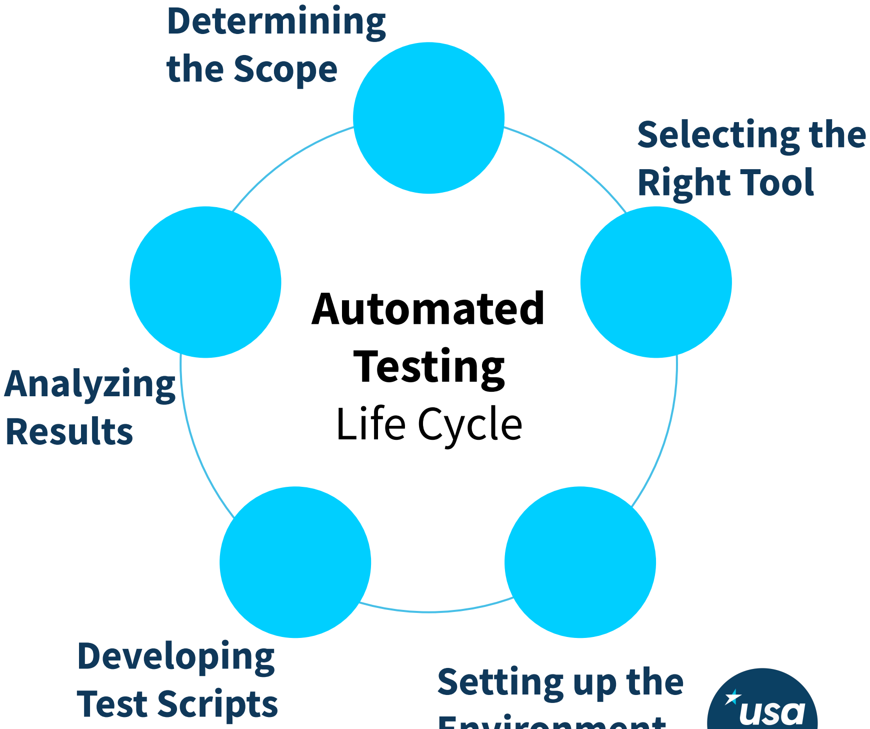
```
# -*- coding: utf-8
from odoo import http
from odoo.exceptions import Valida
from datetime import datetime
import calendar
import math
import pytz
import io, base64

class AdmissionExtensionOnlineController(http.Controller):

    @http.route('/get/type_wise_program', website=True, auth=
    def type_wise_program(self, **kwargs):
        if len(kwargs['types'])<=0:
            return "None"

        types = kwargs['types']
        program_list = []
        domain = []

        if types == 'local_bachelor_program_hsc':
            domain = [('course_id.is_local_bachelor_program_
        elif types == 'local_bachelor_program_a_level':
            domain = [('course_id.is_local_bachelor_program_
        elif types == 'local_bachelor_program_diploma':
            domain = [('course_id.is_local_bachelor_program_
        elif types == 'local_masters_program_bachelor':
            domain = [('course_id.is_local_masters_program_b
        elif types == 'international_bachelor_program':
            domain = [('course_id.is_international_
        elif types == 'international_
            domain = [('
```

PROJECT BACKGROUND

Automated Testing

Goals

- **Research** automated testing tools
- **Prototype** an automated test suite
  - develop test scripts
  - design the testing framework
- **Document** and provide the foundation for this process to eventually be **integrated** into the site's CI/CD pipeline



Prototyping

Creating the Test Suite

Identifying Test Cases

Overview

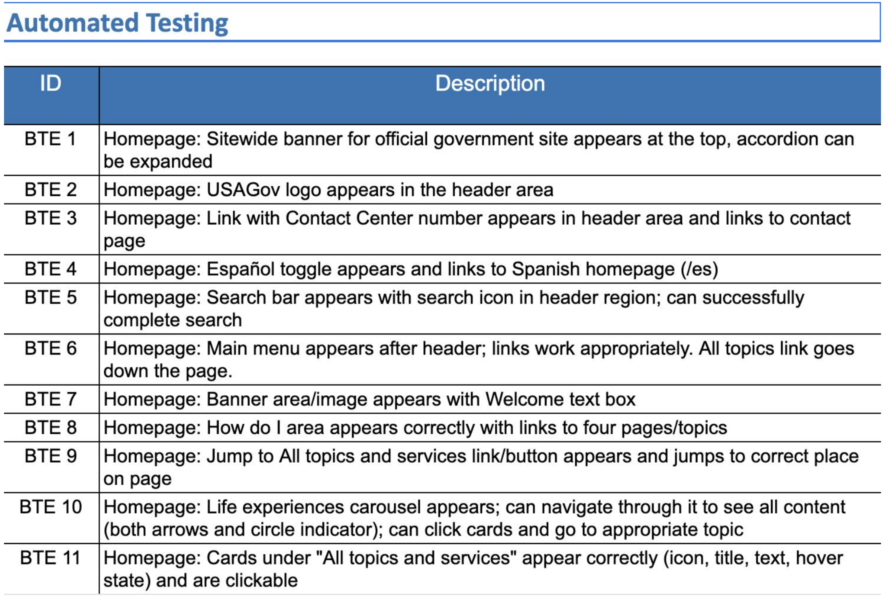
- Review existing manual regression test cases

Identify

- Find tests more suitable for automation
- Begin with critical and frequently executed test cases

Backend vs Frontend

- Bryant tackles backend
- Fellows take on the frontend



Automated Testing

ID	Description
BTE 1	Homepage: Sitewide banner for official government site appears at the top, accordion can be expanded
BTE 2	Homepage: USAGov logo appears in the header area
BTE 3	Homepage: Link with Contact Center number appears in header area and links to contact page
BTE 4	Homepage: Español toggle appears and links to Spanish homepage (/es)
BTE 5	Homepage: Search bar appears with search icon in header region; can successfully complete search
BTE 6	Homepage: Main menu appears after header; links work appropriately. All topics link goes down the page.
BTE 7	Homepage: Banner area/image appears with Welcome text box
BTE 8	Homepage: How do I area appears correctly with links to four pages/topics
BTE 9	Homepage: Jump to All topics and services link/button appears and jumps to correct place on page
BTE 10	Homepage: Life experiences carousel appears; can navigate through it to see all content (both arrows and circle indicator); can click cards and go to appropriate topic
BTE 11	Homepage: Cards under "All topics and services" appear correctly (icon, title, text, hover state) and are clickable

PROTOTYPING

Designing the Framework

Functional Testing

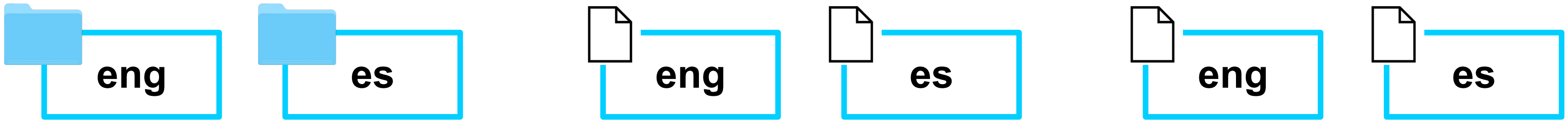
UX, navigation, accordions, clicking buttons, filling in inputs, validating links

Visual Testing

UI, verifying that the site “looks correct” to the human eye

Accessibility

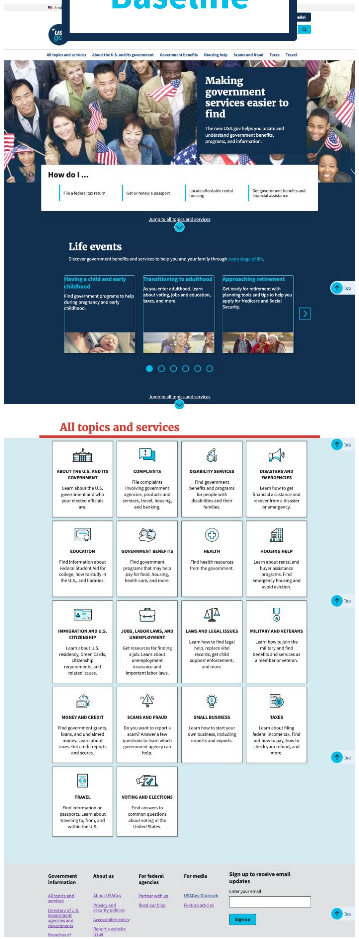
ADA compliance, follows w3c web accessibility standards



Visual Testing

Screenshot Comparison

Baseline



All topics and services | About the U.S. and its government | Government benefits | Housing help | Scams and fraud | Taxes | Travel

Making government services easier to find

The new USA.gov helps you locate and understand government benefits, programs, and information.

How do I ...

- File a federal tax return
- Get or renew a passport
- Locate affordable rental housing
- Get government benefits and financial assistance

Jump to all topics and services

Life events

Discover government benefits and services to help you and your family through every stage of life.

Having a child and early childhood
Find government programs to help during pregnancy and early childhood.

Transitioning to adulthood
As you enter adulthood, learn about voting, jobs and education, taxes, and more.

Approaching retirement
Get ready for retirement with planning tools and tips to help you apply for Medicare and Social Security.

Jump to all topics and services

All topics and services

ABOUT THE U.S. AND ITS GOVERNMENT
Learn about the U.S. government and who your elected officials are.

COMPLAINTS
File complaints involving government agencies, products and services, travel, housing, and banking.

DISABILITY SERVICES
Find government benefits and programs for people with disabilities and their families.

DISASTERS AND EMERGENCIES
Learn how to get financial assistance and recover from a disaster or emergency.

EDUCATION
Find information about Federal Student Aid for college, how to study in the U.S., and libraries.

GOVERNMENT BENEFITS
Find government programs that may help pay for food, housing, health care, and more.

HEALTH
Find health resources from the government.

HOUSING HELP
Learn about rental and buyer assistance programs. Find emergency housing and avoid eviction.

IMMIGRATION AND U.S. CITIZENSHIP
Learn about U.S. residency, Green Cards, citizenship requirements, and related issues.

JOBS, LABOR LAWS, AND UNEMPLOYMENT
Get resources for finding a job. Learn about unemployment insurance and important labor laws.

LAWS AND LEGAL ISSUES
Learn how to find legal help, replace vital records, get child support enforcement, and more.

MILITARY AND VETERANS
Learn how to join the military and find benefits and services as a member or veteran.

MONEY AND CREDIT
Find government grants, loans, and unclaimed money. Learn about taxes. Get credit reports and scores.

SCAMS AND FRAUD
Do you want to report a scam? Answer a few questions to learn which government agency can help.

SMALL BUSINESS
Learn how to start your own business, including imports and exports.

TAXES
Learn about filing federal income tax. Find out how to pay, how to check your refund, and more.

TRAVEL
Find information on passports. Learn about traveling to, from, and within the U.S.

VOTING AND ELECTIONS
Find answers to common questions about voting in the United States.

Government information
All topics and services
Directory of U.S. government agencies and departments
Branches of

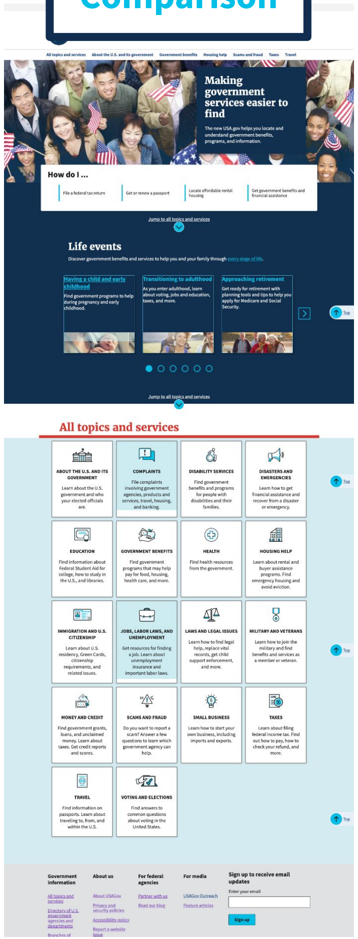
About us
About USAGov
Privacy and security policies
Accessibility policy
Report a website issue

For federal agencies
Partner with us
Read our blog

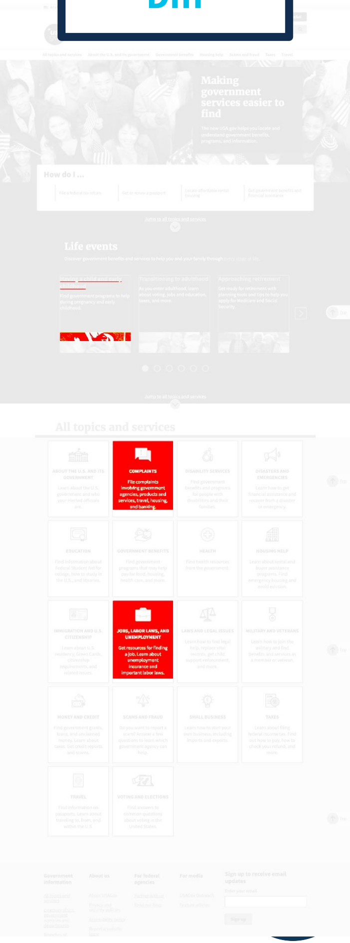
For media
USAGov Outreach
Feature articles

Sign up to receive email updates
Enter your email

Comparison



Diff



PROTOTYPING

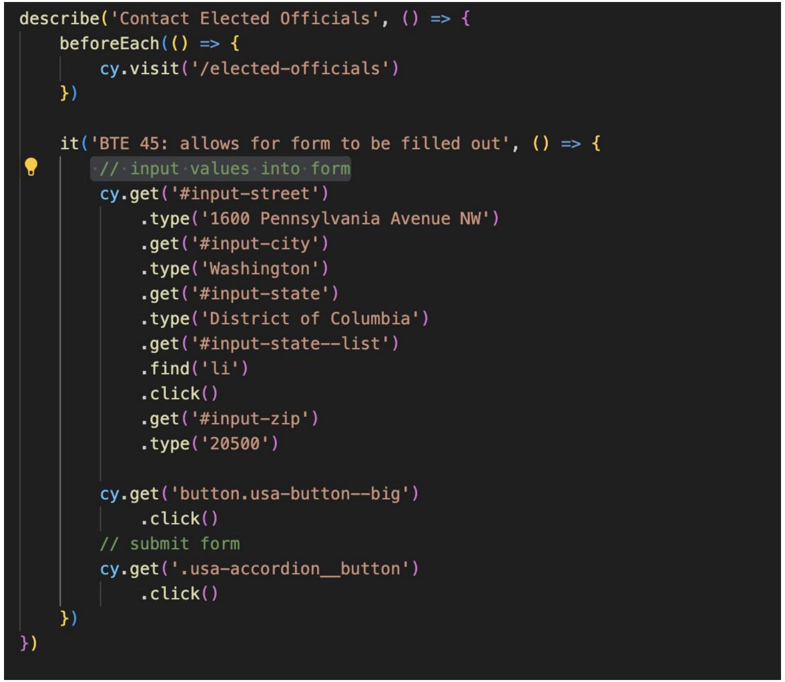
Developing Test Scripts

Script Writing

- Leveraged the DOM framework and components
- Create modular, maintainable, and scalable test scripts

Special cases

- Built robust and stable scripts that handle different scenarios and inputs
- Accordions, carousels, form input, etc.



```
describe('Contact Elected Officials', () => {
    beforeEach(() => {
        cy.visit('/elected-officials')
    })

    it('BTE 45: allows for form to be filled out', () => {
        // input values into form
        cy.get('#input-street')
            .type('1600 Pennsylvania Avenue NW')
            .get('#input-city')
            .type('Washington')
            .get('#input-state')
            .type('District of Columbia')
            .get('#input-state--list')
            .find('li')
            .click()
            .get('#input-zip')
            .type('20500')

        cy.get('button.usa-button--big')
            .click()
        // submit form
        cy.get('.usa-accordion__button')
            .click()
    })
})
```

Results

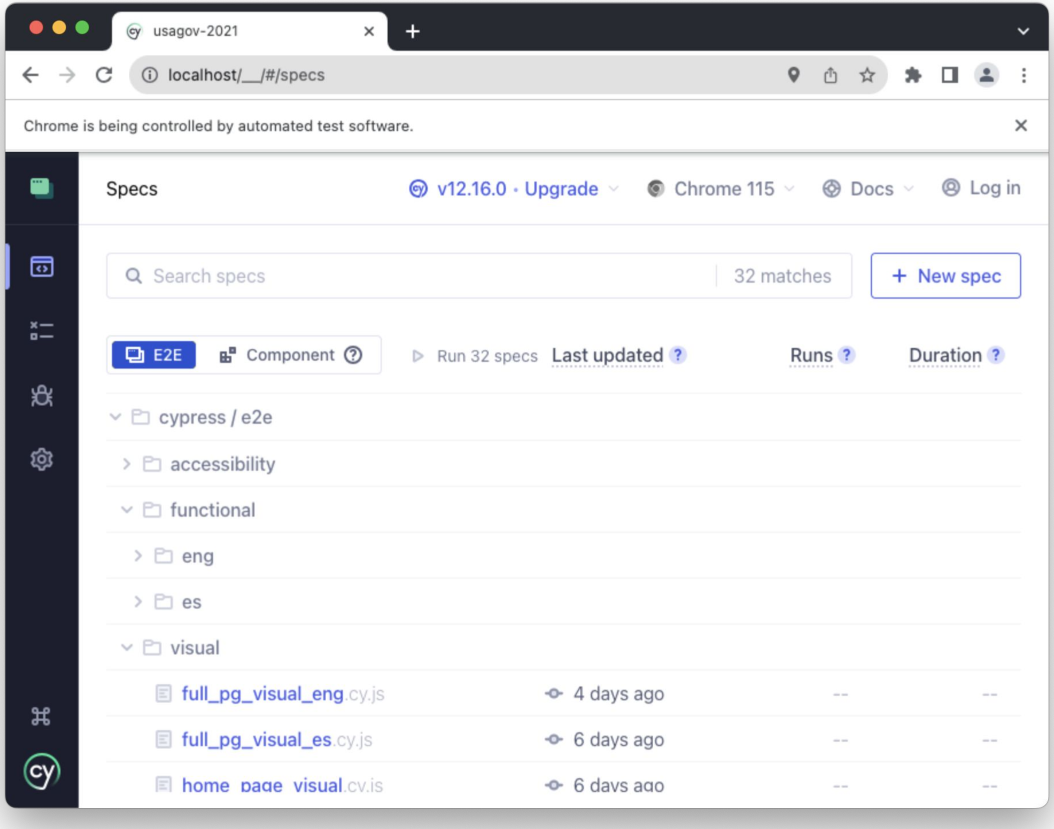
Testing with Cypress

RESULTS

Cypress Test Suite

Summary

- 32 test scripts (specs)
    - ~80 unique test cases
    - ~200 test cases total
- 45 pages
- English & Spanish sites
- ~13 min to run



Chrome is being controlled by automated test software.

	Last updated	Runs	Duration
full_pg_visual_eng.cy.js	4 days ago	--	--
full_pg_visual_es.cy.js	6 days ago	--	--
home_page_visual.cy.js	6 days ago	--	--

Cypress Desktop Spec Page

RESULTS

Cypress Test Suite

Summary

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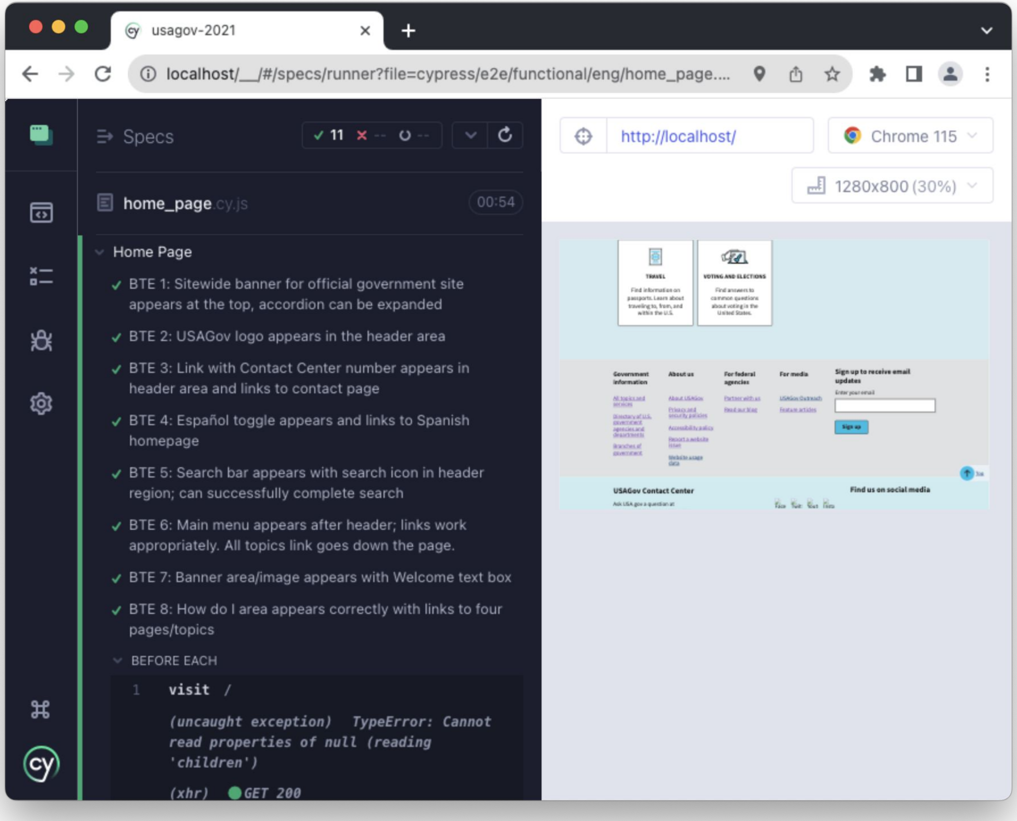


Home Page

- ✓ BTE 1: Sitewide banner for official government site appears at the top, accordion can be expanded
- ✓ BTE 2: USAGov logo appears in the header area
- ✓ BTE 3: Link with Contact Center number appears in header area and links to contact page
- ✓ BTE 4: Español toggle appears and links to Spanish homepage
- ✓ BTE 5: Search bar appears with search icon in header region; can successfully complete search
- ✓ BTE 6: Main menu appears after header; links work appropriately. All topics link goes down the page.
- ✓ BTE 7: Banner area/image appears with Welcome text box
- ✓ BTE 8: How do I area appears correctly with links to four pages/topics

BEFORE EACH

```
visit /
(uncaught exception) TypeError: Cannot
read properties of null (reading
'children')
(xhr) ● GET 200
```

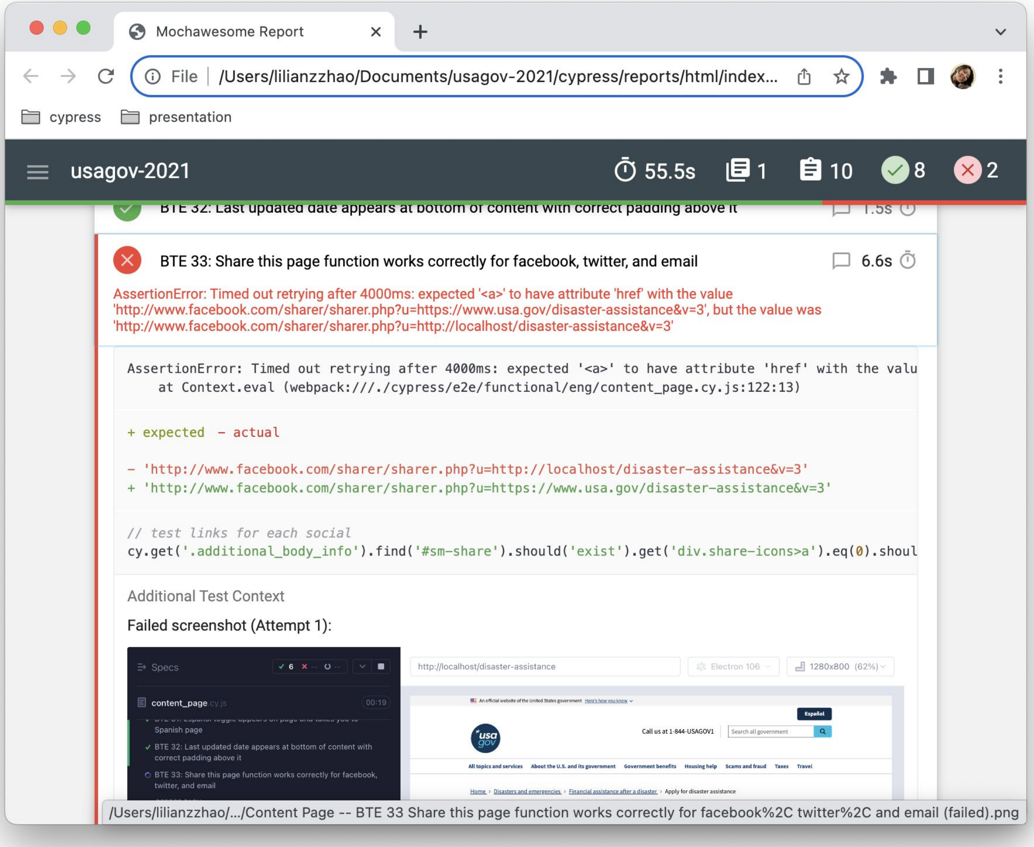
Cypress Desktop Running Tests

RESULTS

Cypress Test Suite

Summary

- 32 test scripts (specs)
  - ~80 unique test cases
  - ~200 test cases total
- 45 pages
- English & Spanish sites
- ~13 min to run


Mochawesome Report
File
/Users/lilianzzhao/Documents/usagov-2021/cypress/reports/html/index...
cypress
presentation
usagov-2021
55.5s
1
10
8
2

BTE 32: Last updated date appears at bottom of content with correct padding above it 1.5s

BTE 33: Share this page function works correctly for facebook, twitter, and email 6.6s

AssertionError: Timed out retrying after 4000ms: expected '<a>' to have attribute 'href' with the value 'http://www.facebook.com/sharer/sharer.php?u=https://www.usa.gov/disaster-assistance&v=3', but the value was 'http://www.facebook.com/sharer/sharer.php?u=http://localhost/disaster-assistance&v=3'

```
AssertionError: Timed out retrying after 4000ms: expected '<a>' to have attribute 'href' with the valu
    at Context.eval (webpack:///./cypress/e2e/functional/eng/content_page.cy.js:122:13)
```

```
+ expected  - actual

- 'http://www.facebook.com/sharer/sharer.php?u=http://localhost/disaster-assistance&v=3'
+ 'http://www.facebook.com/sharer/sharer.php?u=https://www.usa.gov/disaster-assistance&v=3'
```

```
// test links for each social
cy.get('.additional_body_info').find('#sm-share').should('exist').get('div.share-icons>a').eq(0).shoul
```

Additional Test Context

Failed screenshot (Attempt 1):

Specs
6
content_page.cy.js
00:19
Spanish page
BTE 32: Last updated date appears at bottom of content with correct padding above it
BTE 33: Share this page function works correctly for facebook, twitter, and email
http://localhost/disaster-assistance
Electron 106
1280x800 (62%)
An official website of the United States government Here's how you know
Español
Call us at 1-844-USAGOV1
Search all government
All topics and services
About the U.S. and its government
Government benefits
Housing help
Scams and fraud
Taxes
Travel
Home › Disasters and emergencies › Financial assistance after a disaster › Apply for disaster assistance

/Users/lilianzzhao/.../Content Page -- BTE 33 Share this page function works correctly for facebook%2C twitter%2C and email (failed).png

Reporter: Error Message/Debugging

Next Steps

CI/CD Pipeline Integration and Best Practices

NEXT STEPS

Integrating with CircleCI

Compatibility

- Cypress - CircleCI orb
- Simplifies CircleCI integration

Benefits

- USA.gov already deploys from CircleCI
- Direct integration increases efficiency
- Issues can be identified immediately

NEXT STEPS

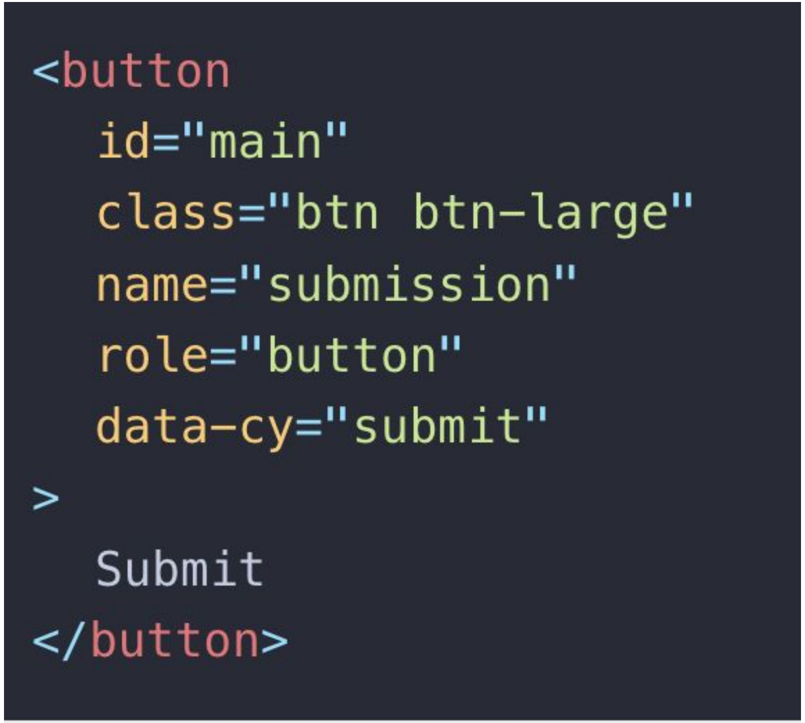
Implementing Best Practices

DOM Query

- Currently with coupled with some JS components

Change

- Include the data-cy identifier in all html components
- Querying for components is much more efficient
- Tests are more likely to still work after changes to website



```
<button
   id="main"
   class="btn btn-large"
   name="submission"
   role="button"
   data-cy="submit"
>
   Submit
</button>
```

Thank you!

USAGov

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Amy Farrell
David Stenger
Bryant Jones

Vote.gov

Christian Medders

Coding it Forward

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Yuyang Zhong

GSA

Annabel Lombard