SYNTHETIC TESTING: THE ART OF FAUX TESTING

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CONTEXT

Synthetic testing is also known as;

Semantic Testing
Synthetic Monitoring Testing
Active/Proactive Monitoring Testing

Popular monitoring approaches like RUM & APM are reactive/passive in nature

Issues are only raised after real users have encountered them

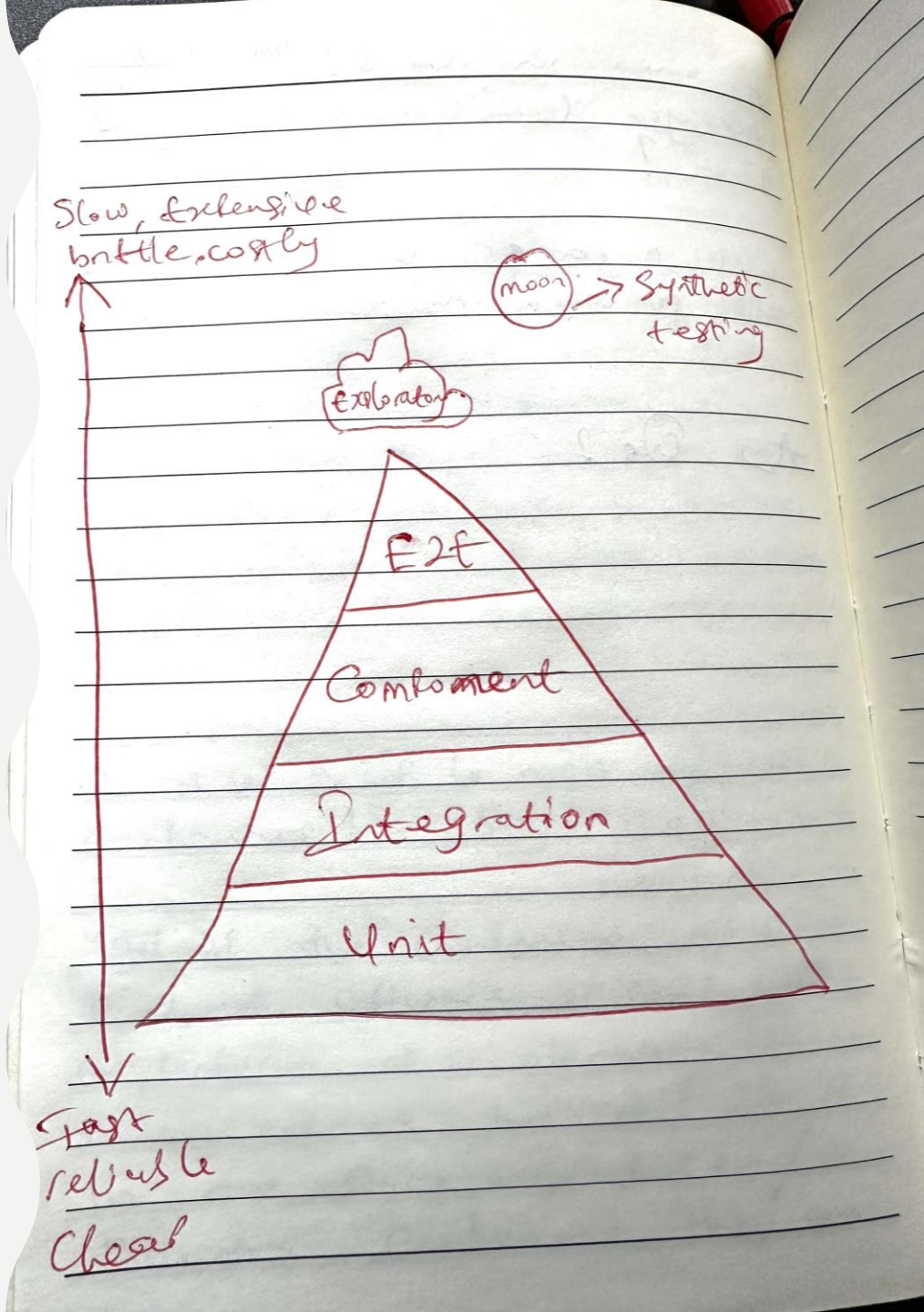
Synthetic testing sought to alleviate this shortcoming by proactively testing & monitoring

CONTEXT

- Definition of synthetic testing (Datadog, Microsoft, & MartinFowler.com)
  - Focus Area:
    - Absolute critical paths – Key user journeys & business functionalities
    - Performance
  - Input Data – Simulated real user data
  - Where (Live):
    - **Production**
    - *Production-like*
  - Outcome:
    - Detecting failing business requirements
    - Identify functional & performance issues
    - Continuously reiterate product's good health & resilience
    - Notify app owners when an issue is encountered (relies on app’s observability)

CONTEXT

- Intersection of testing & observability
  - Agile testing manifesto
- Where does this fall in our testing pyramid?
  - Small subset of E2E
  - Envisioned as “the moon” – shines light on any gap in testing done earlier during development
  - Most expensive in the testing pyramid
  - Less of synthetic testing, more of the rest
  - Feeds from the rest



CLASSES OF SYNTHETIC TESTING

Based on app layer under test	Based on aspects of the app under test
• Browser testing • API testing - Different flavours depending on info exchange protocol used by app e.g., HTTP, SSL, TCP, DNS, ...	• Availability testing - e.g., health checks • Performance testing – Different flavours e.g, load testing, stress testing … • Transaction flow testing - ensure reliability of a feature flow which can involve multiple components • User journey testing – ensure the reliability of specific user journeys which can involve a single component or multiple components or transactions • Smoke testing – Regression or backwards compatibility testing for stability

3 W's - WHERE, WHAT & WHICH

Prod environment – READ ops only

- Simple health checks
- Monitor uptime of critical functionality

Prod-like environment - READ & WRITE ops

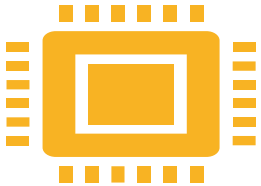
- Same as prod env w/ more flexibility
- Simulating entering new markets – e.g., Opening up functionality to new line of business
- Monitor 3rd party APIs
- Integrate into deployment pipeline for quicker & consistent feedback

See table in next slide showing some recommendations

3 W'S - WHERE, WHAT & WHICH

	API testing	Browser testing	Availability testing	Performance testing	Transaction flow testing	User journey testing	Smoke testing
Prod	R	R	R	-	R	R	R
Prod-like	RW	RW	R	RW	RW	RW	RW

HOW TO



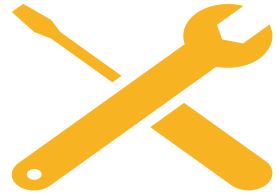
Tools that can be used to set up synthetic testing with ease are as follows;

API

- Datadog synthetic API testing
- Postman (SDK for securely integrating into deployment pipeline)
- AWS CloudWatch Synthetics Canary Blueprints
- Spring Boot Actuators (Need to be used in conjunction w/ some of the other tools)
- JMeter
- Wrk

UI

- AWS CloudWatch Synthetics Canary Blueprints
- Cypress
- Selenium



Review some of these tools - TBC

DEMO

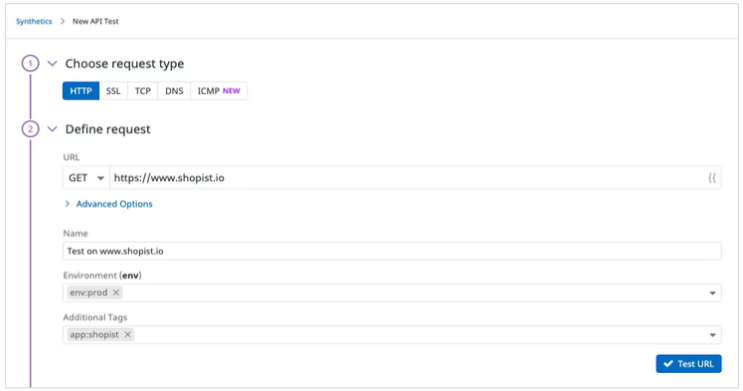
DD Synthetic testing....

AWS CloudWatch Synthetics Canary Blueprints...

DEMO – DD SYNTHETIC TESTING

Define request

1. In the Datadog site, hover over **Digital Experience** and select **Tests** (under **Synthetic Monitoring & Testing**).
2. Click **New Test** > **New API test**.
3. Select the `HTTP` request type.
4. Define your request:
   - Add the URL of the endpoint you want to monitor. If you don't know what to start with, you can use `https://www.shopist.io/` , a test e-commerce web application. Defining the endpoint to test automatically populates the name of your test to `Test on www.shopist.io` .
   - You can select **Advanced Options** to set custom request options, certificates, authentication credentials, and more.
     Note: You can create secure global variables to store credentials and create local variables to generate dynamic timestamps to use in your request payload. After creating these variables, type `{{` in any relevant field and select the variable to inject its value in your test options.
     In this example, no specific advanced option is needed.
   - You can set tags such as `env:prod` and `app:shopist` on your test. Tags allow you to keep your test suite organized and quickly find tests you're interested in on the homepage.
5. Click **Test URL** to trigger a sample test run.



Define assertions

Clicking **Test URL** automatically populates basic assertions about your endpoint's response. Assertions define what a successful test run is.

In this example, three default assertions populate after triggering the sample test run:

automatically populates the name of your test to `Test on www.shopist.io` .
- You can select **Advanced Options** to set custom request options, certificates, authentication credentials, and more.
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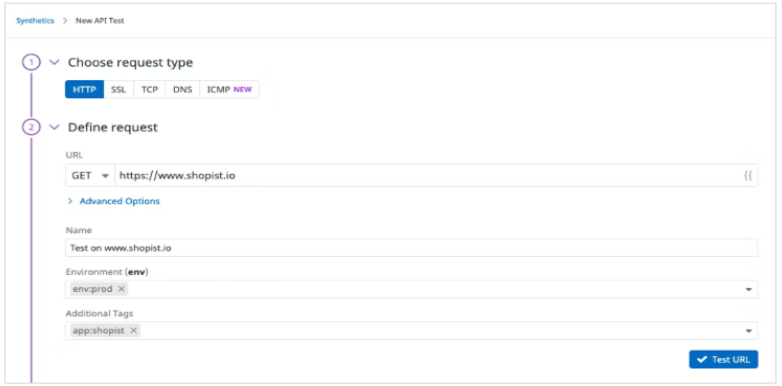

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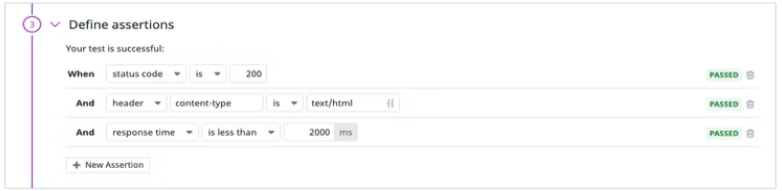
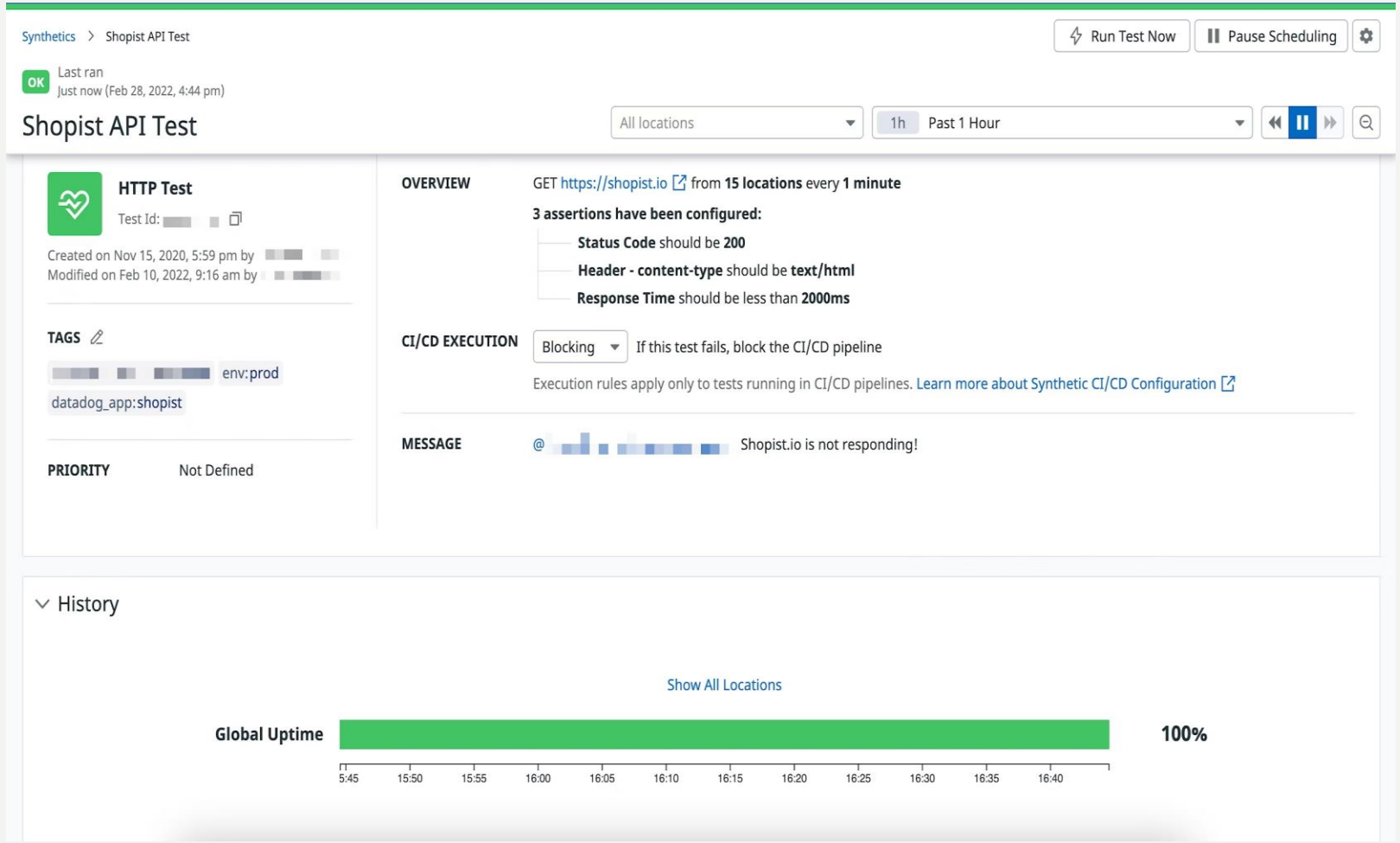
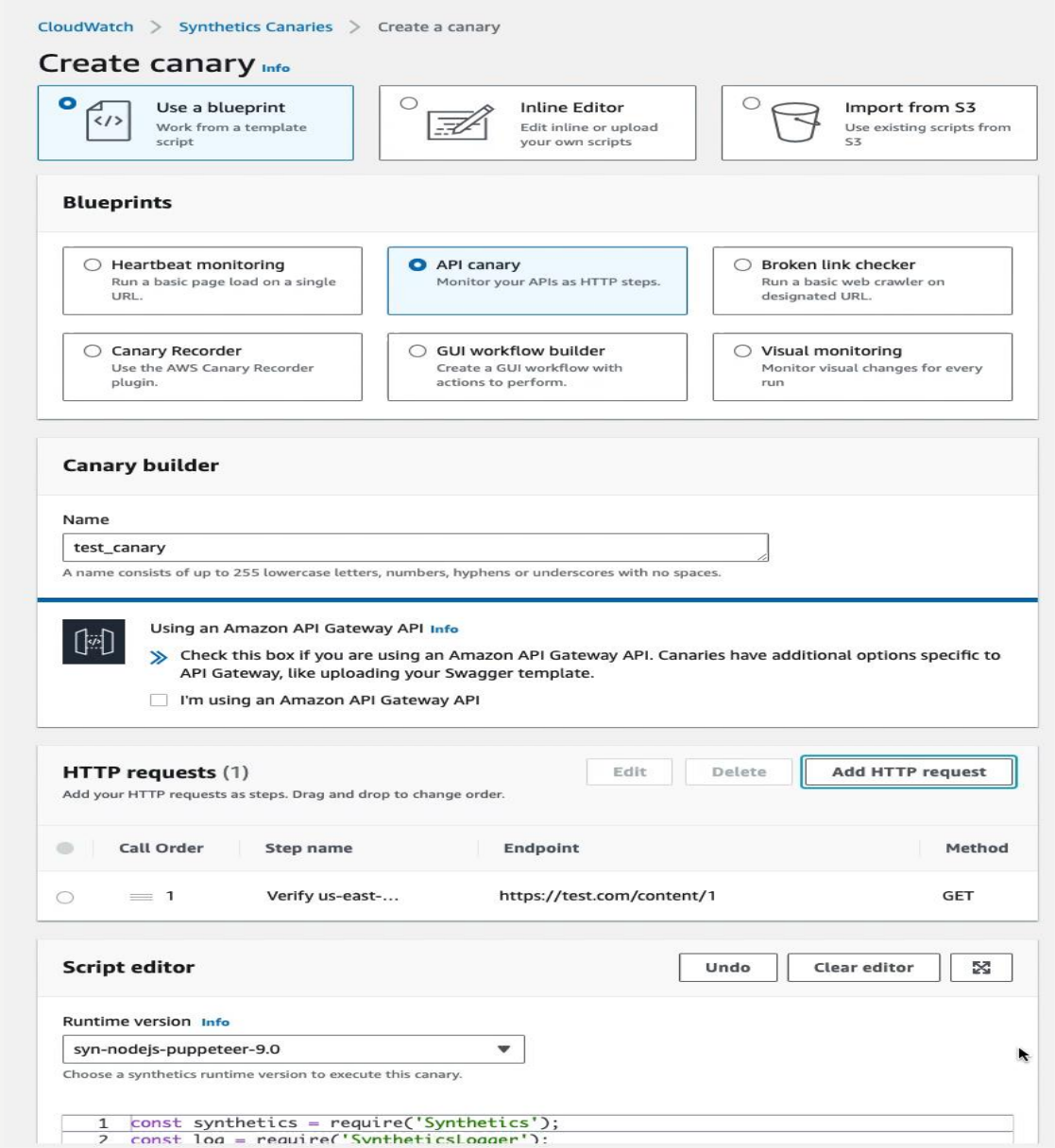


Assertions are fully customizable. To add a custom assertion, click on elements of the response preview such as the headers or click **New Assertion** to define a new assertion from scratch.

DEMO – DD SYNTHETIC TESTING



DEMO - AWS CLOUDWATCH SYNTHETICS CANARY BLUEPRINTS



BENEFITS & DRAWBACKS

Benefits

- Shifts focus from MTBF to MTTR
- Minimizes MTTR
- Confidently expand to new markets & regions
- Achieve performance objective –
  - Makes it easier to adhere & maintain system OKRs, SLOs, & SLAs.
- Informs performance objectives –
  - AWS Observability motto – *"Remember to build, measure, learn, repeat!"*
  - Set sensible expected baseline for app's current state
  - Good benchmark metrics isn't set in stone – Metrics need to evolve!
- More regular releases – A must have to drive towards daily deploys

Drawbacks

- **Effort vs Value:** UI/Browser tests can be quite brittle. Upfront effort to set up test might not necessarily yield long term benefits if the UI changes ever so often.
- Cost vs Value

CONCLUSION

From AWS Serverless badge – ***"When you're operating your serverless applications at scale, you can't afford to fly blind. You need to be able to answer important operational and business questions"***

It shouldn't be a case of passive VS active monitoring but combination of both gain more insight into these questions

Reaffirms app-level operational goals

Most dev teams already abit of synthetic testing implemented for their apps. This can be taken further.

Healthy ≠ Functional

Why wait for the user to uncover this for you? Be proactive!

ANY QUESTIONS ?

RESOURCES

- My blog post on synthetic testing - https://dkmdebugin.medium.com/synthetic-testing-the-art-of-faux-testing-429379b3bee2
- Datadog docs on synthetic testing - https://docs.datadoghq.com/synthetics/
- AWS docs on AWS Cloudwatch canary blueprint - https://docs.aws.amazon.com/AmazonCloudWatch/latest/monitoring/CloudWatch_Synthetics_Canaries_Blueprints.html#CloudWatch_Synthetics_Canaries_Blueprints_GUI_Workflow