Becoming A Toolsmith:

Lessons learned from software testing and tool experimentation

QA Global Summit 2021

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Introduction

- I'm currently working as a Principal QA Engineer at Secureworks
  - https://www.secureworks.com/
- I have been a tester for approximately 15 years, in agency and product companies
- I enjoy experimenting with test tools, and learning more about Rapid Software Testing methodology
  - https://www.satisfice.com/rapid-testing-methodology
- I'm also a part-time writer
  - https://leanpub.com/toolstrategiesforlonetesters
- I like considering myself as simply a tester, and I'm proud of it

Story time...

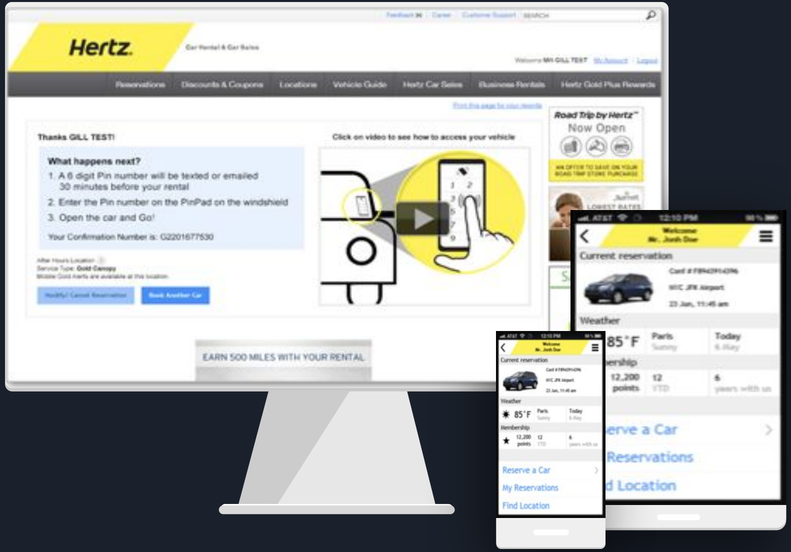
<u>Note to the audience:</u> *This is a very verbose slide deck that will go in one of my GitHub repos. Why is it so verbose? <u>For posterity reasons</u>. I want <u>future generations of testers</u> to look through these slides and <u>learn on their own time</u>.*

The Journey - Everyone Starts Somewhere

Hertz eCOMMERCE

My career started at the Hertz Corporation, a car rental company approximately 3,000 locations worldwide

- Was a part of the Hertz eCommerce Team (2006-2016)
- At Hertz the QA role was originally seen as more of an entry level role to train future Business Analysts, and junior testers were expected to learn the Hertz systems
- Hertz eCommerce was in charge of a very large monolithic system with multiple channels for creating car rental reservations
    - Various types of human operated POS systems
    - Web reservations
    - Mobile
    - Kiosks



Thanks GILL TEST!

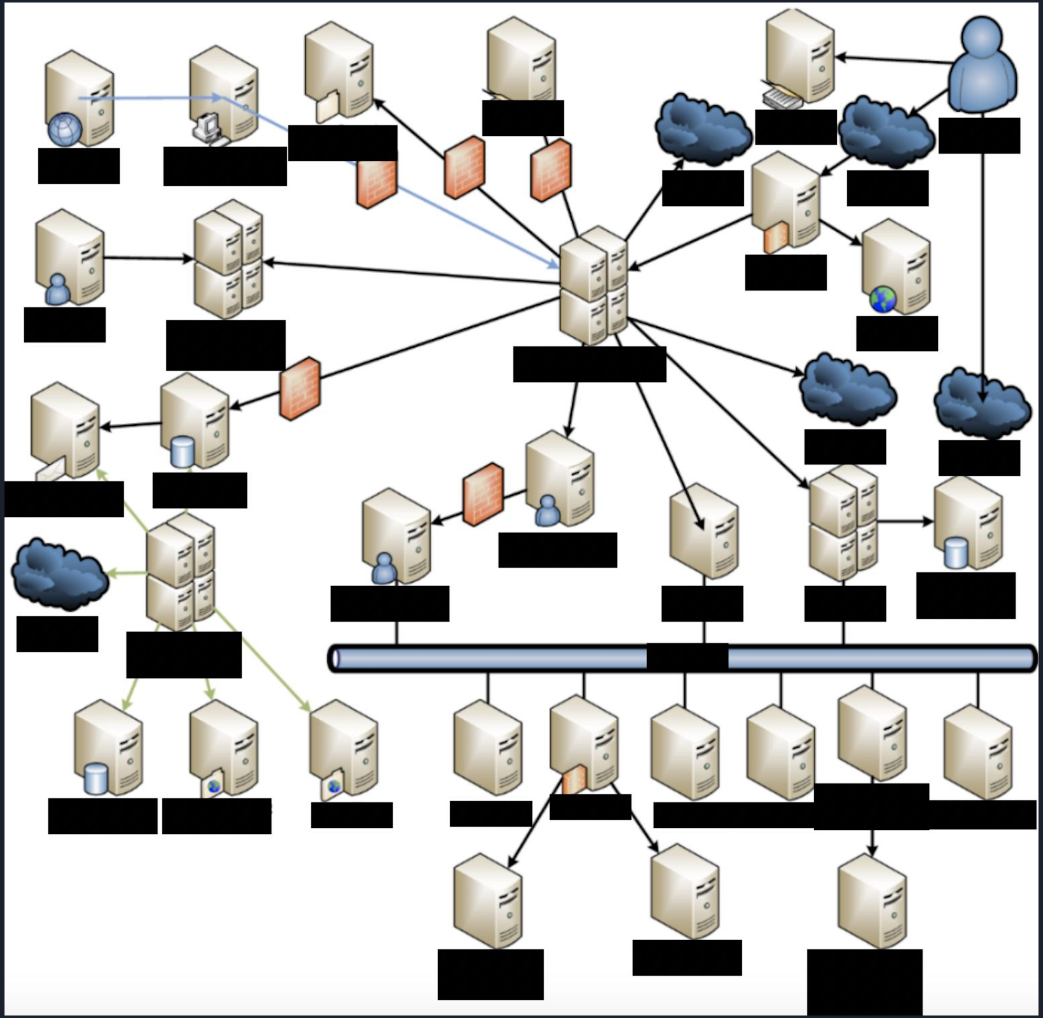
What happens next?

1. A 6 digit Pin number will be texted or emailed 30 minutes before your rental
2. Enter the Pin number on the PinPad on the windshield
3. Open the car and Go!

Your Confirmation Number is: G2201677530

Click on video to see how to access your vehicle

An actual high-level diagram of the Hertz Car Rental Application (2006-2016)



As a founding member of the original 3 person “Hertz eCommerce QA” team...

- We were dealing with aging complex systems
  - An IBM DB2 backend
  - Various old and complex mainframes running COBOL

- We focused on the eCommerce risk areas that were most accessible to the 3 of us
  - All Hertz-owned websites (almost a dozen types, customer-facing and internal)
  - Mobile applications

- All test processes were performed manually and kept in very long Word Docs at first
  - Eventually we transferred them to large Excel spreadsheets
  - Roughly 80,000 rows long
  - With hundreds of different types of test accounts

- Dozens of projects a month, and the application kept growing and getting more complex

- Eventually regression test cycles in the Hertz release process grew from 2 days split between 3 people, to 4 days, then 8 etc.

eCommerce management soon began to realize the value of the tester role

- We were asked to research automation tools, ended buying HP Quick Test Professional licenses
- Difficult to have only 3 guys working on creating automation while simultaneously performing the existing regression test process
- eCommerce management decided to invest even more into the QA team, including hiring automation specialists
- Over 4 years the QA team grew to approximately 40 people (by around 2010)

By 2013, I was the only remaining founding QA member left

- Testing domain knowledge of Hertz systems became extremely valuable to Hertz leadership
- My QA Director at the time encouraged me to become a QAI Certified Software Tester (CSTE) and paid for my training and certification
- I was placed in charge of the Hertz QA Tools & Automation Team, which grew to 8 people at its peak
- We worked closely with all testers who focused on manual coverage

- By 2013 we had also created a lot of automation
  - Approximately 10,000 lines of HP Quick Test Professional code for IE, and Selenium Webdriver to cover gaps in other browsers
  - Automation covered more than 80% of all the Hertz eCommerce apps
  - Automation reduced a one week regression test cycle (basically 80% of the 80,000 row Excel sheet) to approximately 5 hours

- Working closely with every test specialist and test lead on the Hertz QA team made the automation effort a success

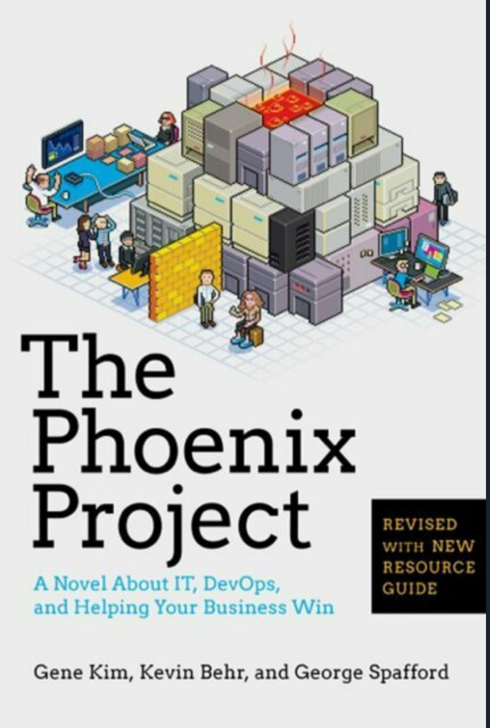
- High risk areas remained in the capable hands of test leads and specialists, and were not automated
  - Legacy systems (COBOL systems mentioned previously) and super admin dashboards were too expensive and risky to automate
  - Testing proprietary Hertz hardware such as POS devices, kiosks, etc. remained a task for testing specialists and leads

This went on for two more years until...

The Journey - First Turning Point

By 2015 Hertz eCommerce tech leaders and managers started to realize the risks and complexities of their aging deep monolith

- The Hertz car rental application had become too expensive to manage, maintain, change etc.
- eCommerce Managers decided to “break apart the monolith” and re-architect it into Microservices using IBM Bluemix (now called IBM Cloud)
- During this huge re-architecture project covering the entire Hertz web application, the tech leaders required every person to read this book…


The Phoenix Project
A Novel About IT, DevOps, and Helping Your Business Win
REVISED WITH NEW RESOURCE GUIDE
Gene Kim, Kevin Behr, and George Spafford

From Gene Kim's book, one quote stood out and stuck to my mind...

- "Any improvements made anywhere besides the bottleneck are an illusion."
- This quote was my first turning point

I started to more clearly see the many bottlenecks, limitations, poor judgement, and constraints that were caused by the old legacy systems, aging technology stacks, and unnecessary bureaucracy across the different Hertz Corporation technology departments... here are some examples

- Aging and brittle IBM DB2 machines located in an Oklahoma City data center (simple office building), which was coincidentally geographically located in a known deadly tornado hot zone
- Few people at the Hertz Corporation took the time to transfer knowledge about those old systems
- Draconic firewall "red tape" that blocked changes for up to 6 months and sometimes 1 year, etc.

With that mindset of identifying bottlenecks throughout the Hertz tech stacks, I took a step back and saw similar issues in the existing QA tool sets used for regression testing...

- It became difficult to justify the 5 hour automation run time to the 2015 Hertz eCommerce tech leadership, especially when they expected it to work with IBM Bluemix's CI/CD pipelines
- In 2015, HP Quick Test Professional only supported Windows environments
- Internet Explorer was the most reliable browser to use with QTP, Firefox and Chrome required plugins
  - Plugins broke often, with every Chrome and Firefox browser update
- HP Quick Test Professional licenses were very expensive and limited
  - Ten pack of licenses cost approximately $120,000 a year (one cost $12,000)
  - Scalability was limited to the amount of licenses you own
- Scaling out HP Quick Test Professional was done using Windows desktop virtualization with Citrix (also expensive at that time)
- HP documentation was very poor, customer service was terrible, helpful online communities were non-existent in 2015

By 2016, the Hertz eCommerce team had reached a critical breaking point

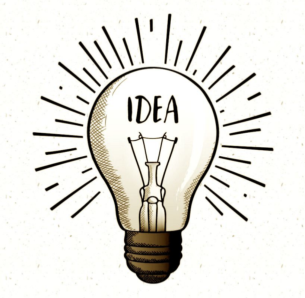
- None of the milestones for the re-architecture project were met
- The legacy systems were too complex to break up without completely disrupting normal Hertz business operations
- Hertz eCommerce was viewed as "too slow and a huge cost center" for the Hertz Corporation
- It was decided by the CEO and CTO that "Hertz is NOT a technology company
- The same day that announcement was made the entire Hertz eCommerce team was being laid off, and severance withheld until everyone's IBM replacement was trained…

When life handed out lemons…

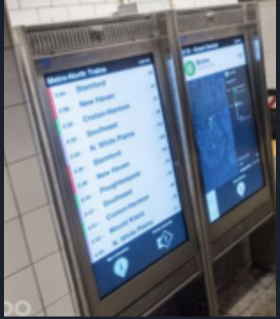
… I decided to make lemonade.

During the month that I should have been teaching my replacements, I instead…

- Focused on filling the gaps in my knowledge and avoiding the same pitfalls
- Reflected on the disadvantages of the Hertz QA team's tools, and I also realized the overall Hertz test strategies became obsolete in the "age of microservices"
- Decided to try to avoid the pitfall of turning my tools into an unmaintainable and mysterious monolith
- Learned valuable lessons from that experience which turned into 5 criteria that I used to help me research and evaluate tools for my future projects or jobs
  - <First Criteria> I need tools that have better accessibility, help me move quickly, and are simple enough for anyone to understand
  - <Second Criteria> I need tools that have good community support, or at least great documentation if no community exists. Having both would be ideal.
  - <Third Criteria> I need tools that are easily scalable and free from the limitations of expensive licenses
  - <Fourth Criteria> I need tools that are portable across different platforms (MacOS, Windows, Linux etc.)
  - <Fifth Criteria> I need tools that have reliable external libraries or plugins for expanding its reach
- During the majority of my remaining weeks at Hertz I started teaching myself Robot Framework automation and experimenting with Docker.



Intersection



Almost 4 weeks after my layoff from the Hertz Corporation in 2016, I met the Intersection QA Director through a recruiter

- Not long after that, I accepted an offer to work with her at Intersection Co.

- My 3 years in the Intersection Consulting and Solutions (ICS) team was my first experience working in a consulting agency
  - ICS Test Team worked on rapidly developed prototypes, IoT platforms, chatbots, smart city projects, the Empire State Building Observation Deck, and other interesting things
  - Adapting quickly was critical for every project

- Every ICS Tester was considered a one-person test team for their designated projects, responsible for every aspect of testing

The ICS team's daily context switching and rapid pace eventually inspired my…

The Journey - Second Turning Point

During my 3 years in the ICS team, I set myself on a learning path to become a more adaptable and flexible lone software tester and strategist

- I became a little obsessed with self-learning and researching
- Experimented with many types of test approaches and tools (for testing, DevOps etc.)
- Kept an open mind to new ideas, practiced creating new strategies, and searched for thought-leaders in the software testing industry

I got better at rallying people around the strategies and approaches I created

- Which required me to wear many hats… Teacher, mentor, researcher, technical lead, but always kept my tester hat in my other hand
- Created working POCs that could be mapped back to a clear testing goal or capability that my team needed for projects
- Quickly learned how to “thrive in chaos” and adapt my approach to frequent context switching

Eventually, my search for software testing thought-leaders brought me to the work of James Marcus Bach

- I started studying and teaching myself his Rapid Software Testing methodology, which triggered my second turning point
- I would often read through his articles on “A Context-Driven Approach to Automation in Testing” and “Session-Based Test Management”
  - https://www.satisfice.com/download/a-context-driven-approach-to-automation-in-testing
  - https://www.satisfice.com/download/session-based-test-management
- I started reading “Lessons Learned in Software Testing: A Context-Driven Approach”. It has become my favorite book for self-study.
- I constantly reminded myself, “let risk be your compass”. This is one of the key concepts James describes in “Omega Tester: Testing With a Team of One”
  - https://www.satisfice.com/download/omega-tester-testing-with-a-team-of
- I was studying Rapid Software Testing Methodology concurrently with my tools research, and explored ways to blend both into my test strategies and plans

James Bach, Founder and CEO of Satisfice, Inc.

OMEGA TESTER:
TESTING WITH A TEAM OF ONE

RST RAPID SOFTWARE TESTING
A CONTEXT-DRIVEN METHODOLOGY

Lessons Learned - Some Advice For Your Journey

You may wonder...

- What is the gist or process for starting the automation toolsmith journey from square one?
- If I start today, what should I try doing?

Start with an assessment of your goals... what are they? And it would help to base them on project risks

- Maybe you have a list of repetitive challenges or high priority testing goals at your work environment, your project, or maybe you are curious about automation technologies and need a focused approach
- Map out each of those challenges or tasks into your own outlines, and be descriptive about the steps and procedures that feed them
    - For example your outlines could look similar to the following

```
First Outline Title: High-level goal of these tasks

First repetitive task
   [Risk Level] High
   Step one for this first task
   Step two for this first task
   ... etc.

Second repetitive task
   [Risk Level] Low
   Step one for this second task
   Step two for this second task
   ... etc.

Second Outline Title:... etc.
```

- Create your strategy from your outlines and think about how you alone would be able to handle it

One way to approach QA toolsmith self-teaching is to dive into adaptable, flexible, mature and accessible testing tools

- Select a tool that allows you to experiment quickly and continuously
- Consider tools that are quick at turning your natural language phrases into automation
- Start with learning what you need to get done within your work environment or project
    - Turn those needs into goals to automate towards with tools of choice
    - Focus solely on the essence of those tasks.
    - Focus on that outline you wrote.

I suggest giving Keyword Driven Testing tools a try

- Robot Framework is a well maintained, adaptable, and accessible Keyword Driven Testing and automation framework
- In the following example notice that it contains similar elements from the outline that was shown in the previous slide

~~~
```Natural language phrases in Robot Framework syntax
*** Settings ***

Documentation    High-level goal of these tasks

*** Test Cases ***

First repetitive task
   [Tags]    High Risk Level
   Step one for this first task
   Step two for this first task

Second repetitive task
   [Tags]    Low Risk Level
   Step one for this second task
   Step two for this second task
```
~~~

Lessons Learned - Feed Your Curiosity, <u>Experiment In A Focused Way</u>

Focused PDCA, Deming Circle, Shewhart Cycle

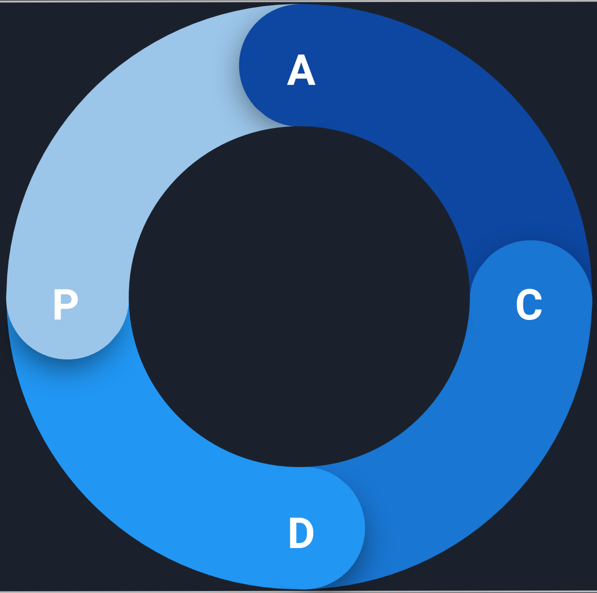
- Based on the Scientific Method, and this is how I view it
- hypothesis–> experiment–> evaluation, or plan–> do–> check
- The "act" phase connects into the next iteration of the "plan", with improvements and lessons learned

Plan

Perform research, establish focused objectives, and ALIGN THEM WITH YOUR TEAM'S GOALS.

Do

Execute the plan, perform focused experiments and gather results.

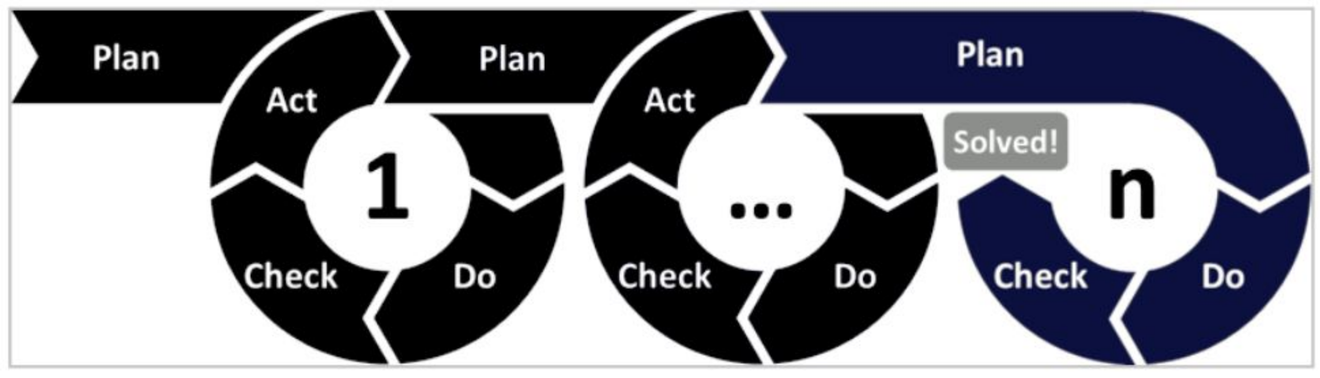


Act

Identify what worked and what did not. Plan again, make improvements, and LEARN FROM MISTAKES.

Check

Evaluate the results of the experiments. Compare to the expected outcomes.



After your first success, move on to your next challenge. After your second success, experiment more, etc.

- Iterate, improve, find out what works/what doesn’t
- Go through multiple PDCA cycles until you solve the problem
- Sometimes you will fail but don’t be discouraged

Research frequently and remember that no approach is perfect

- There are no silver bullets
- ”There are no best practices...there is no practice that is better than all other possible practices” - James Bach https://www.satisfice.com/blog/archives/5164

Don’t blindly follow “best practices”, keep an open mind

- Somewhere out there in the open source community etc.
- Someone is crafting a better approach, tool, framework, or library.
- Be open minded and see if there’s something that it does that your approach doesn’t do.

Experiments And Side Projects

Here are some experiments and side projects I am working on

- My experiments...
  - Medium articles
    - https://ixn.intersection.com/continuous-learning-to-guide-testing-decisions-a69ee295c1fd
    - https://ixn.intersection.com/how-machine-learning-can-assist-testers-f42ce28e4792
    - https://medium.com/@joshua.gorospe/turn-your-test-teams-automation-into-monitoring-and-alerting-using-robot-framework-rpa-and-fa4fdf841591
  - Scala library for the Robot Framework test tool
    - https://github.com/jg8481/robotframework-scala-remote-library
  - Conversational AI test assistant using a framework called Leon AI
    - https://github.com/jg8481/leon/tree/develop/packages/robotframework-test-assistant
  - Workshops and repos I have used at the RoboCon and Test Leadership Congress conferences
    - https://github.com/jg8481/Getting-Started-Robotframework-AppiumLibrary-RoboCon-2021
    - https://robocon.io/#strategies-for-creating-your-own-conversational-test-assistant-with-robot-framework-and-other-tools
    - https://github.com/jg8481/Tool-Strategies-Lone-Testers-Test-Leadership-Congress-2019
    - https://github.com/jg8481/Robot-Framework-Lone-Tester-Strategies-RoboCon-2019
    - https://github.com/jg8481/Getting-Started-Robotframework-AppiumLibrary-RoboCon-2021
  - Demonstration of a machine learning approach combined with an AI test assistant. If it detects Git commit risks scores of a certain amount the AI test assistant triggers Slack and email alerts
    - https://drive.google.com/file/d/1znOeDkgB-xjEtgJND7jCxhEWIBO0FXWe/view
  - YouTube videos
    - https://youtu.be/sEYyV_MO9GM
    - https://youtu.be/oo11OlAaWWA
    - https://youtu.be/9HHgrLb41go
    - https://youtu.be/cdG4qgyTSSk
    - https://youtu.be/l8xRoDh5f38

- My side projects...
  - Work in progress book
    - https://leanpub.com/toolstrategiesforlonetesters
  - RoboCorp tech articles
    - https://hub.robocorp.com/robotic-process-automation/basics-of-rpa/what-is-robot-framework-about/
    - https://hub.robocorp.com/robotic-process-automation/software-robot-developer/software-robot-developer-learning-path/
    - https://hub.robocorp.com/development/best-practices/options-for-checking-your-rpa-scripts/
    - https://hub.robocorp.com/development/best-practices/language-server-protocol-for-robot-framework/

All done ^_^
Hope this presentation
was helpful.