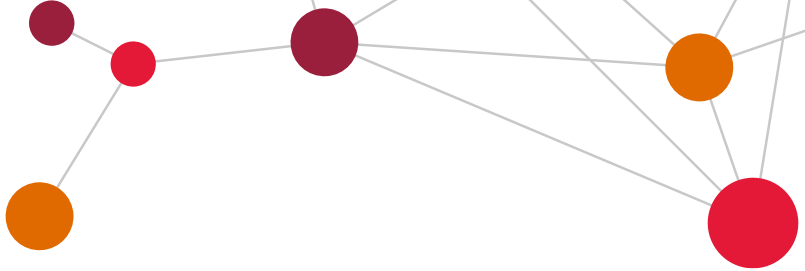
Quality Engineering

Nov 2022

Agenda



CGI

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CGI at a glance

Founded in 1976
46 years of excellence

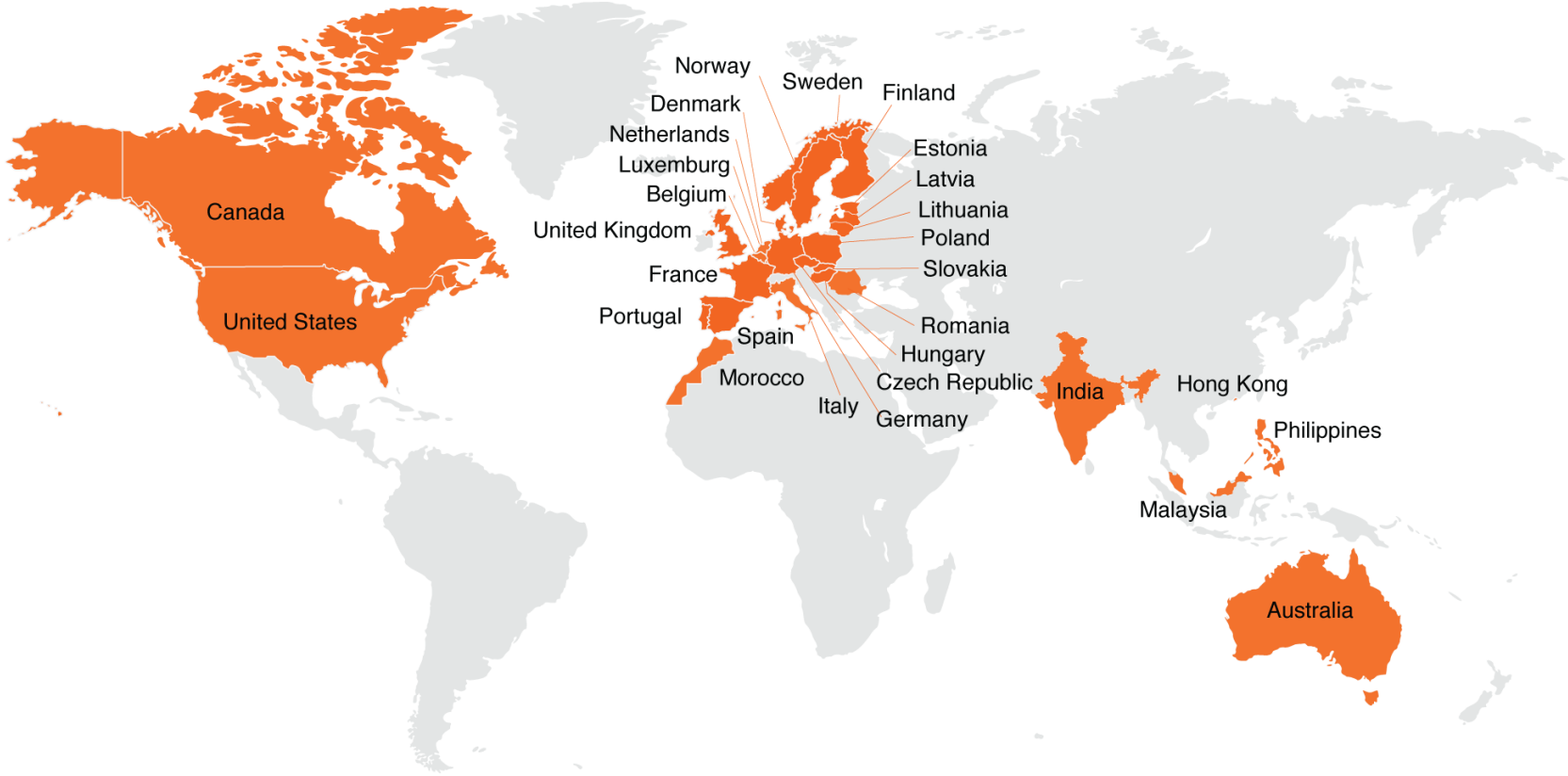
CA$12.1 billion revenue

78,000 consultants

400 locations in **40** countries

5,500 clients benefiting from end-to-end services across **10 focused industries**

170+ IP-based solutions serving **50,000** clients



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What drives us?

Our dream

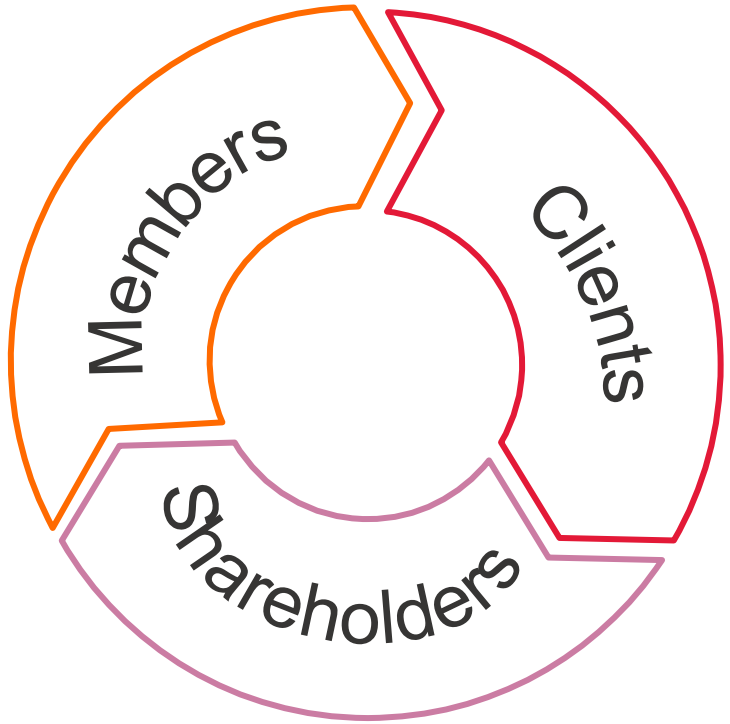
To create an environment in which we enjoy working together and, as owners, contribute to building a company we can be proud of.

Our mission

To help our clients succeed through outstanding quality, competence and objectivity, providing thought leadership and delivering the best services and solutions to fully satisfy client objectives in information technology, business processes and management. In all we do, we are guided by our Dream, living our Values to foster trusted relationships and meet our commitments now and in the future.

Our vision

To be a global world class end-to-end IT and business consulting services leader helping our clients succeed.



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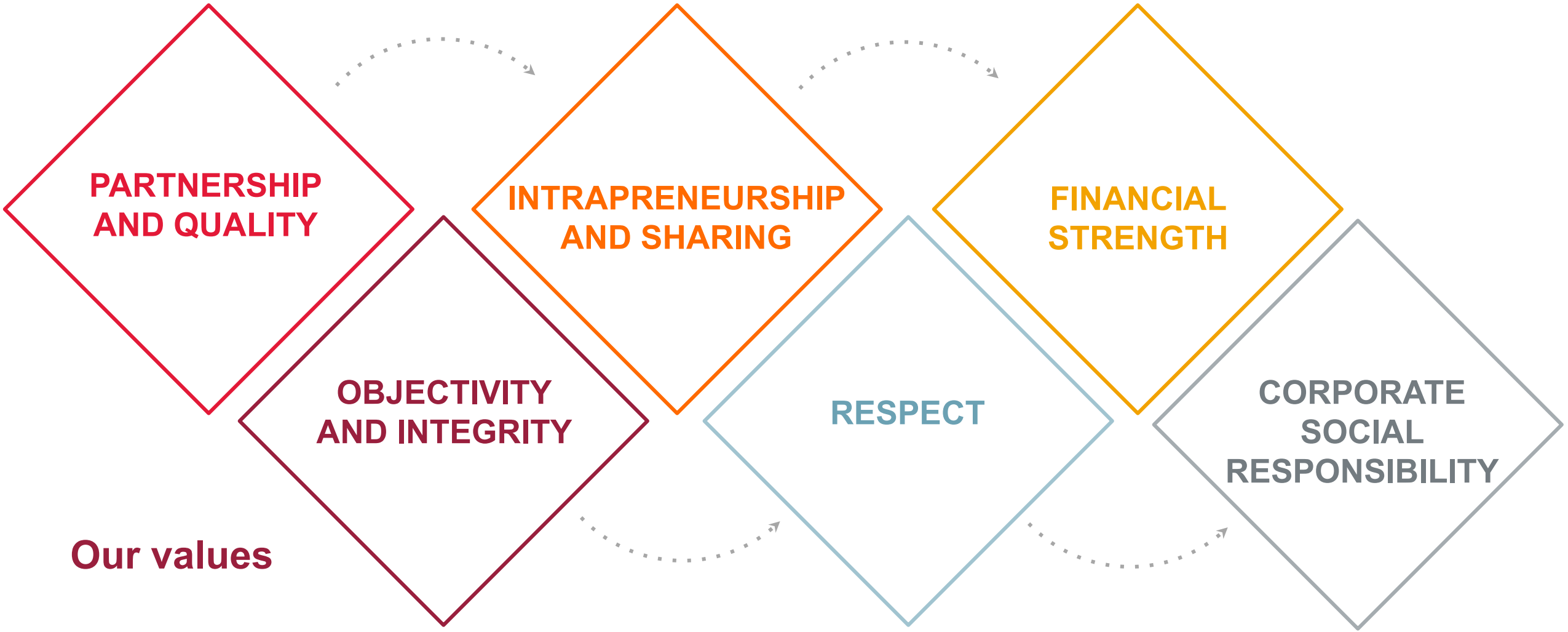
What guides us?



Our values

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A few of our clients

Financial Services

BNP PARIBAS
ING
TD
PNC
SOCIETE GENERALE

Health

CMS
DMS
HUS
NHS
Pfizer

Government

esa
HM Government

Communications

at&t
Bell
comcast
TeliaSonera
vodafone

Utilities

EDF
Hydro Québec
NSTAR

Oil & Gas

bp
TOTAL
ExxonMobil

Manufacturing

AIRBUS
VOLVO
BOMBARDIER
EADS
MICHELIN
RioTinto

Transportation

amadeus
DB SCHENKER
KLM
NSW Transport for NSW

Post & Logistics

DHL
LIVINGSTON
LA POSTE
CANADA POST POSTES CANADA

Retail & Consumer Services

Carrefour
L'ORÉAL
LVMH
MOLSON Coors
Auchan

Over **5,500** commercial and government organizations worldwide

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College Recruiting Overview

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Early Careers at CGI

Our programs will give you the fundamentals to ease & accelerate you assimilation into CGI.

CGI's intern program offers students real-world technical & business consulting experience

Top Workplace in (Washington, D.C. metro, Baltimore, MD, Pittsburgh, PA, Cleveland, OH, Atlanta, GA, Charlotte, NC)
Collegegrad.com Top 100 Entry Level Employer
Collegegrad.com Top 100 Intern Employer
Best and Brightest in Wellness
America's Best Employer for Diversity &
America's Best Employer for Women—
by a leading publication

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Full Time Roles

Software Developer

- System design
- Systems and application development
- Data design
- Database administration
- Defining and maintaining data security and integrity

Programmer/Analyst

- Testing and implementation of new technology
- Software installation and configuration
- Investigate and debug errors, troubleshoot issues
- Develop and build code applications
- Write technical documents
- User Support

Business Analyst

- Business analysis
- Requirements gathering
- Direct user support and analysis
- Tracking software and
- documentation defects
- Onsite consulting and training
- System testing
- Decision analysis

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Intern Roles

Business Analyst Intern

- Client requirements gathering and analysis
- Tracking testing and document of defects
- Onsite client consulting and support
- Writing program and system user manuals and/or training materials

Development/Engineering Inter

- Create systems design utilizing client requirements
- Applications development and computer programming
- Database maintenance and configuration management
- Software installs, technical testing and reporting

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Quality Engineering

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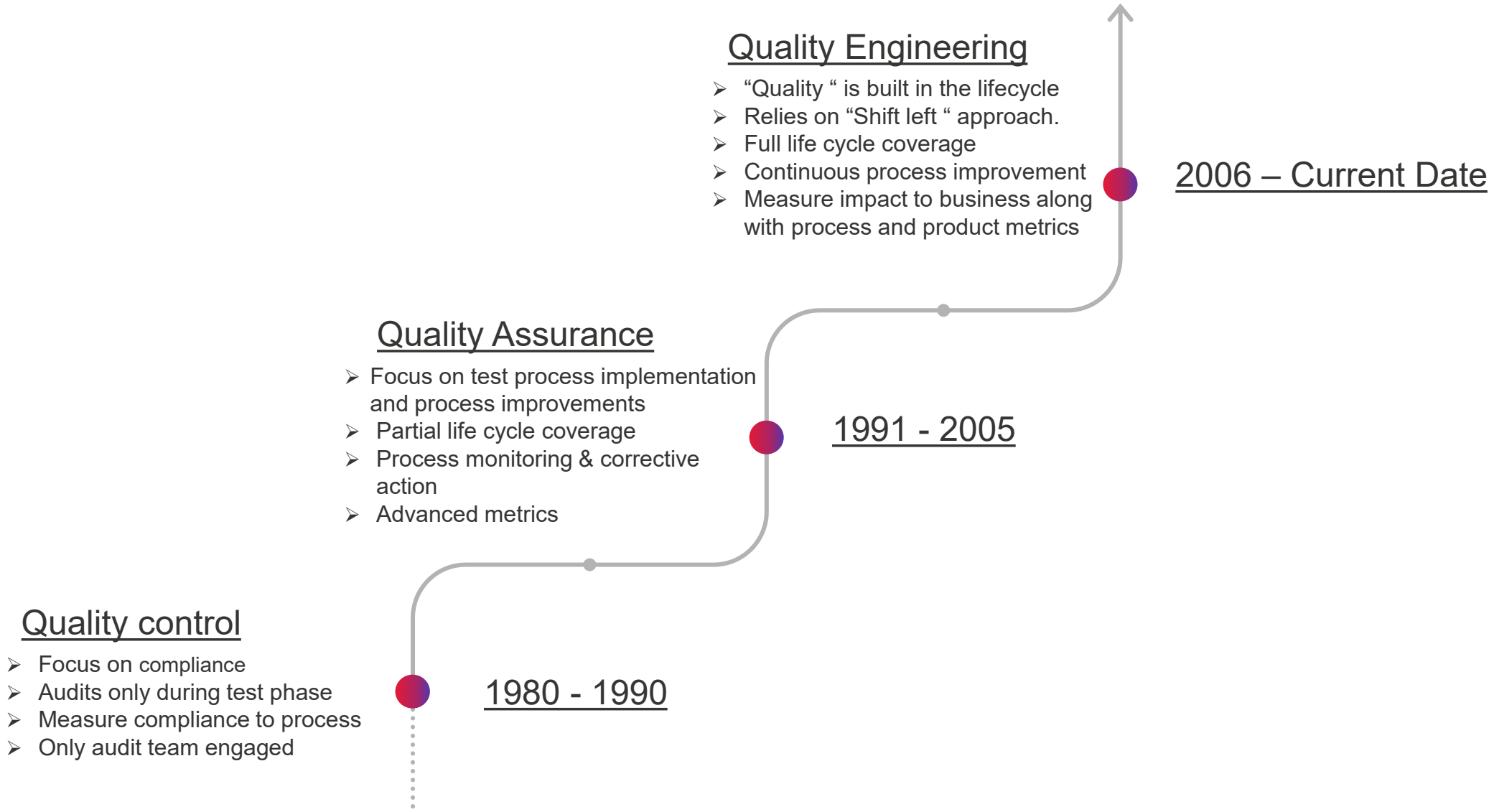
Quality Engineering Evolution



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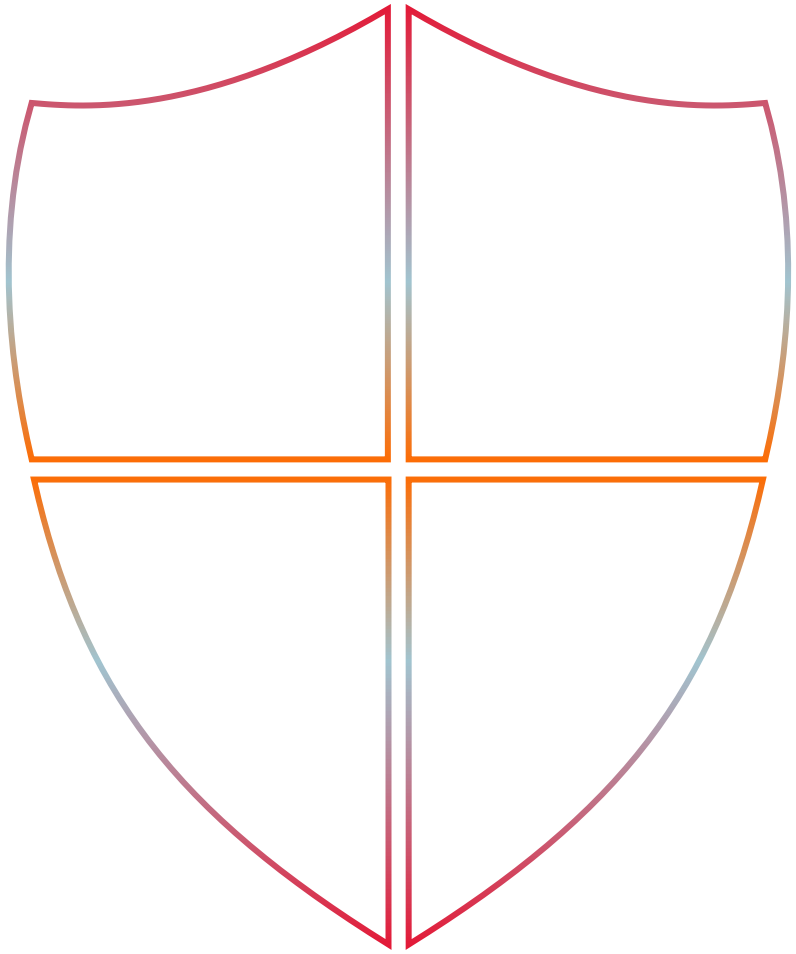
Driving Factors – Quality Engineering

Speed to market
Alignment with agile principles
.

Technical Debt Reduction
Focused approach to build robust applications



Accountability
Everyone is accountable for software quality

End User Focused
Plan and deliver value to end users

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Software Testing Specializations

1. **API Testing:** API testing is a software testing practice that tests the APIs directly — from their functionality, reliability, performance, to security. Part of integration testing, API testing effectively validates the logic of the build architecture within a short amount of time.

2. **Front End or UI Testing:** The goal of Front End Testing is to test functionalities and verify that a website or app's presentation layer is bug or error-free

3. **Security or Vulnerability Analysis (Penetration Testing):** Vulnerability assessment, one of the most important phases of penetration testing, occurs when your team maps the profile of the environment to publicly known or, in some cases, unknown vulnerabilities.

4. **Availability Testing:** Availability Testing which is also called Durability Testing is a kind of performance testing in which the application runs for a set period of time and collects failure events and repair times, and compares the availability percentage to the service level agreement.

5. **Mobile Testing:** Mobile testing is the process by which applications, software and websites designed for mobile devices are tested for functionality, usability, and consistency.

6. **Data Quality Testing:** Ensuring data is moving from one system to another, is transformed correctly, stored correctly. This needs knowledge of how different sorts of data are stored, processed and used in an application or several applications. It has below 2 common implementations:
7. **. Data Warehouse or ETL Testing:** It is a testing method in which the data inside a data warehouse is tested for integrity, reliability, accuracy and consistency in order to comply with the company's data framework. The main purpose of data warehouse testing is to ensure that the integrated data inside the data warehouse is reliable enough for a company to make decisions on.
8. **Big Data Testing:** This is a testing process for a big data application in order to ensure that all the functionalities of the application work as expected. In Big Data testing strategy, QE members verify the successful processing of large data volumes using commodity cluster and other supportive components.

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Evolution of UI Testing

- Manual Testing
- Waterfall Methodology
- 1980 – 1990

- Bulky Automation Tools
- Different Development Approaches
- 1990 – 2000

- Robust Automation Tools
- Open Source Frameworks
- Agile projects and Faster release process
- 2000-2010

- DevOps Integrated Dev and Test tools
- 2010 - 2018

- Autonomous Testing
- Machine Leaning and AI
- Future of Testing

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Agenda

- **Healenium**
- **Kubernetes**
- **OpenShift**
- **Selenide**

- Healenium is a Java library leveraging Machine Learning (ML) algorithms for identifying webpage changes and fix it during runtime test executions.
- Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.
- OpenShift is a commercial product for automating deployment, scaling, and management of containerized applications, comes with lot of ready to use features.
- Selenide is a Concise fluent higher level APIs for stable UI automation tests. Aiming low code, low maintenance coding approach for future test automations

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Topic Summary

Topic	Tech Keywords / Setup Guide Included	Remarks
Healenium	LCS algorithm / Yes Sample Git project / Yes	open-source
Kubernetes	WSL & Kali Linux setup / Yes Docker Setup / Yes Docker Desktop Setup / Yes K8s Setup Guide / Yes Dockerhub account creation / Yes	open-source
OpenShift	Features / Yes	RedHat/IBM Product
Selenide	Sample Git project / Yes Selenide Features – Git project / Yes	open-source

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Docker, Kubernetes and OpenShift

- Docker, Kubernetes and OpenShift – What is it ?
- How Docker, Kubernetes and OpenShift helps Operations, Dev team to accelerate Deliveries
- How Docker, Kubernetes and OpenShift helps Quality Engineers (QEs) to be more productive

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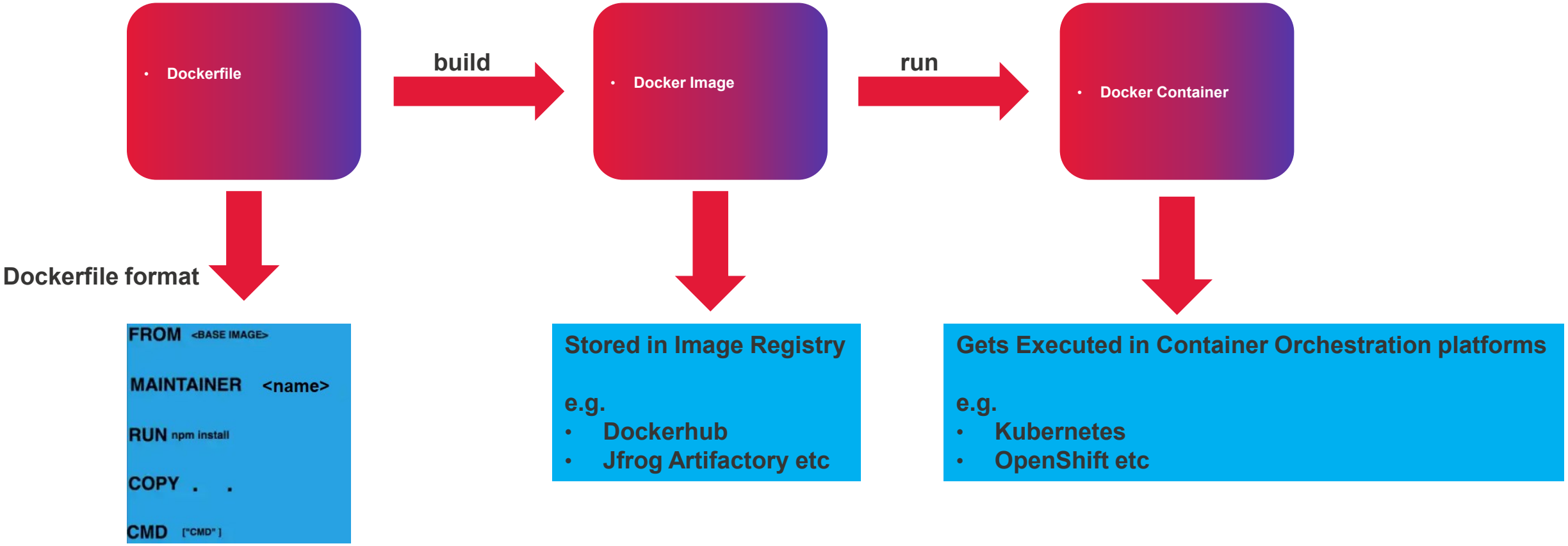
What is Docker and It's life cycle



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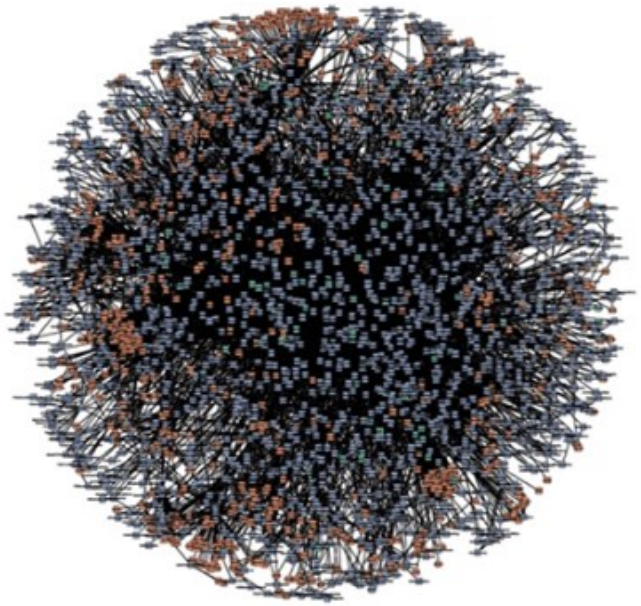
Why do we need Container Orchestration tools

Microservices Integrations are complex and needs Orchestration !



amazon.com

NETFLIX

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Kubernetes vs OpenShift

Aspects	OpenShift	Kubernetes
Type	Product	Open source Project
Flexibility	Limited	Flexible to Enhancements
Security	Strict	Easy to Maintain Security
Deployment	DeploymentConfig	Deployment objects
Routing	Router Objects	Ingress object for external access
Management	Image streams	Not so easy to manage container images
Networking	Native options	Needs to plug 3rd party plugins
User Experience	Better	Needs Additional tools

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Healenium

Healenium is a Java library leveraging Machine Learning (ML) algorithms for identifying webpage changes and fix it during runtime test executions. Healenium is backed by PostgreSQL to store Application DOM state.

- Features:
  - Healenium Web jars
  - Tree comparing to get best subsequence of DOM (refer **LCS** vs Greedy vs Recursive Algorithms)
  - Healenium backend for report generation
  - PostgreSQL to store element info
- How to setup Healenium Backend using docker-compose
  - GitHub - healenium/healenium
- Why **LCS** Algorithm used by Healenium
  - Longest Common Subsequence (programiz.com)

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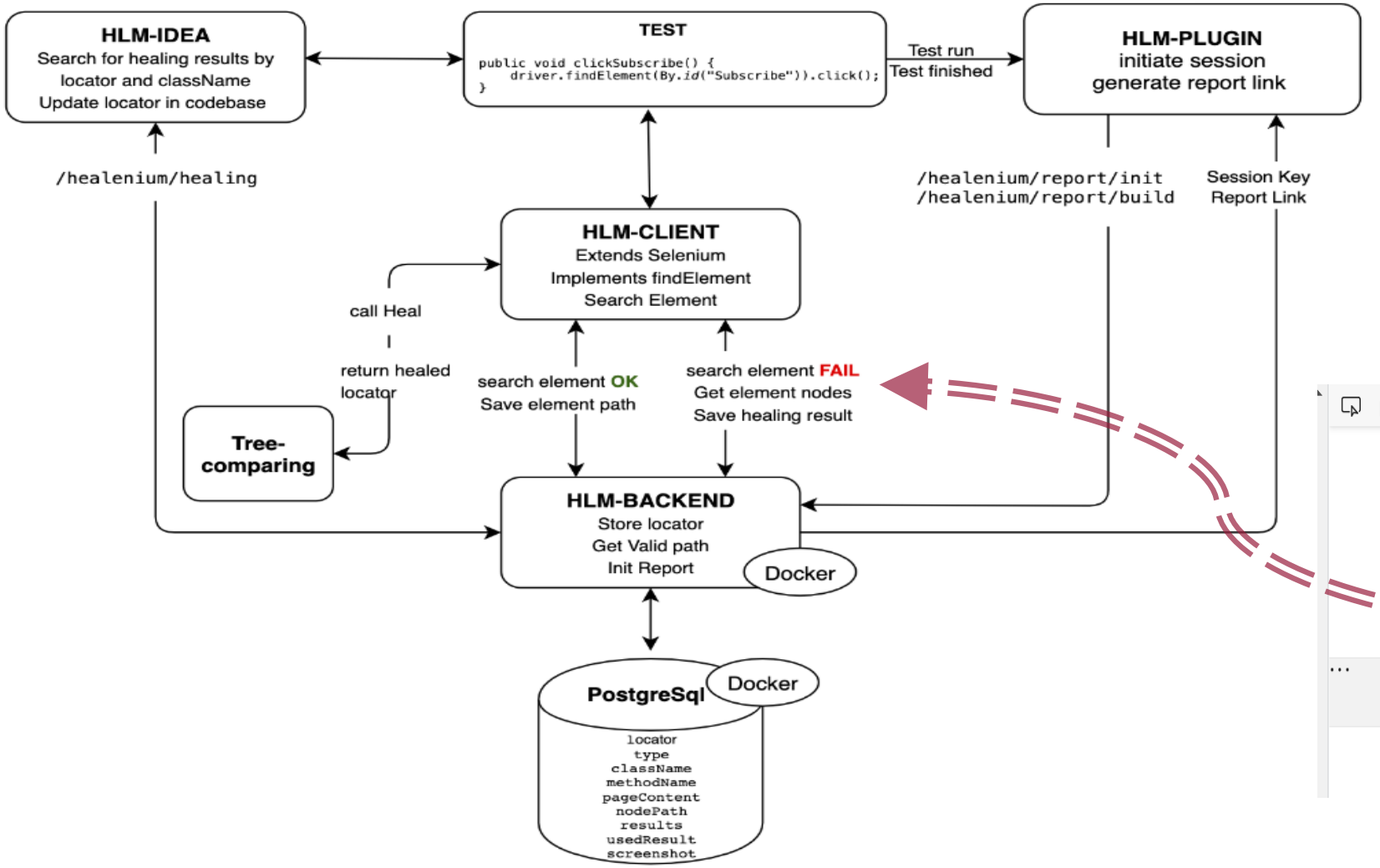
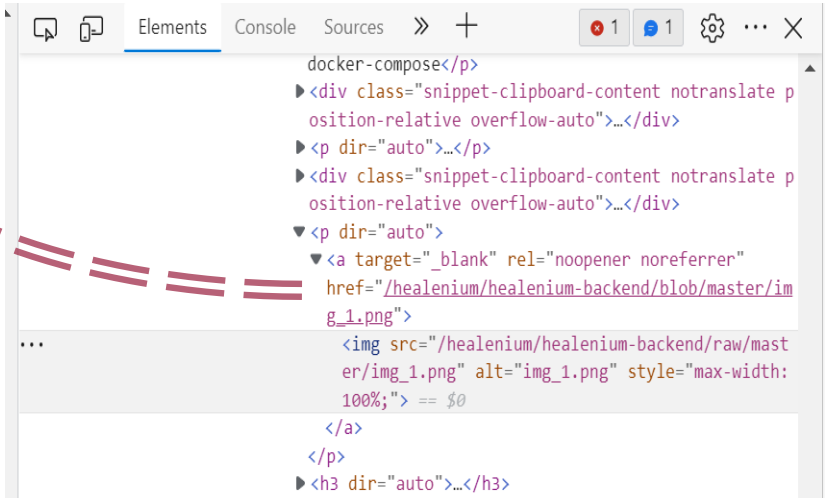
Healenium - Architecture

BACKEND AECHITECTURE DIAGRAM





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Healenium - Implementation

- **Healenium Web**
- **Healenium Backend**

```
<dependency>
        <groupId>com.epam.healenium</groupId>
        <artifactId>healenium-web</artifactId>
        <version>3.3.1</version>
</dependency>
```

1. Init driver instance of SelfHealingDriver

```
//declare delegate
WebDriver delegate = new ChromeDriver();
//create Self-healing driver
SelfHealingDriver driver = SelfHealingDriver.create(delegate);
```

2. Specify custom healing config file healenium.properties under test/resources directory, ex.:

```
recovery-tries = 1
score-cap = 0.5
heal-enabled = true
hlm.server.url = http://localhost:7878
hlm.imitator.url = http://localhost:8000
```

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Selenide

Selenide is a Concise fluent higher level APIs for stable UI automation tests. Aiming low code, low maintenance coding approach for future test automations

- Features:
  - Concise fluent API for tests
  - Stable tests
  - Powerful selectors
  - Simple configuration

- Examples :
  - Selenide vs Selenium · selenide/selenide Wiki · GitHub
  - Selenide examples · GitHub

- Build your own Selenide Test :
  - GitHub - selenide-examples/selenide-allure-junit

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Demo – Healenium, Selenide

- **Selenide framework setup and execution from local machine in 2 min**
- **Healenium Backend Infrastructure running in Kubernetes**

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Useful notes to setup on your machine !

- **Kali Linux Setup on Windows WSL - https://www.kali.org/docs/wsl/win-kex/#install-kali-linux-in-wsl2**
- **Docker setup in Kali Linux -** Installing Docker on Kali Linux | Kali Linux Documentation
- **Kubernetes setup in Kali Linux -** Install and Set Up kubectl on Linux | Kubernetes
- **Docker vs VMs -** docker vs vm - Search Images (bing.com)
- **Dockerhub Account creation** - Docker ID accounts | Docker Documentation
- **Docker Desktop setup** - Install on Windows | Docker Documentation
- **Healenium implementation :**
  - Healenium: Self-Healing Library for Selenium-Based Automated Tests (automatetheplanet.com)
  - Healenium

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Questions

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Wishing all of you great success in your career!

Please reach out to us for any questions

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