Trivy - scan docker image

Trivy is an open-source, container image vulnerability scanner that helps detect vulnerabilities in your container images and packages. It is designed to be easy to use, fast, and highly accurate, with support for a variety of package managers and container registries.

Trivy can scan container images for known vulnerabilities in their operating system packages, application dependencies, and configuration files. It can also check for insecure configurations or hardcoded credentials within the container image.

Trivy is highly configurable and can be integrated into various development workflows, including CI/CD pipelines, local development environments, and container orchestration systems.

Overall, Trivy is a powerful tool for improving the security of your containerized applications by providing an automated way to detect vulnerabilities and prioritize remediation efforts.

Run trivy

```
docker run -v /var/run/docker.sock:/var/run/docker.sock -v $HOME/Library/Caches:/root/.cache/ aquasec/trivy:0.38.2
image python:3.4-alpine
or
docker run --rm -v $HOME/Library/Caches:/root/.cache/ aquasec/trivy  python:3.4-alpine
```

Create bash script custom scan with trivy

```
#!/bin/bash
dockerImageName=$(awk 'NR==1 {print $2}' Dockerfile)
echo $dockerImageName
docker run --rm -v $WORKSPACE:/root/.cache/ aquasec/trivy:0.17.2 -q image --exit-code 0 --severity HIGH --light
$dockerImageName
docker run --rm -v $WORKSPACE:/root/.cache/ aquasec/trivy:0.17.2 -q image --exit-code 1 --severity CRITICAL --light
$dockerImageName
   # Trivy scan result processing
   exit_code=$?
   echo "Exit Code : $exit_code"
   # Check scan results
   if [[ "${exit_code}" == 1 ]]; then
      echo "Image scanning failed. Vulnerabilities found"
      exit 1;
   else
      echo "Image scanning passed. No CRITICAL vulnerabilities found"
   fi;
```

The code **`$(awk 'NR==1 {print $2}' Dockerfile)`** runs an **`awk`** command in a shell script context, where:

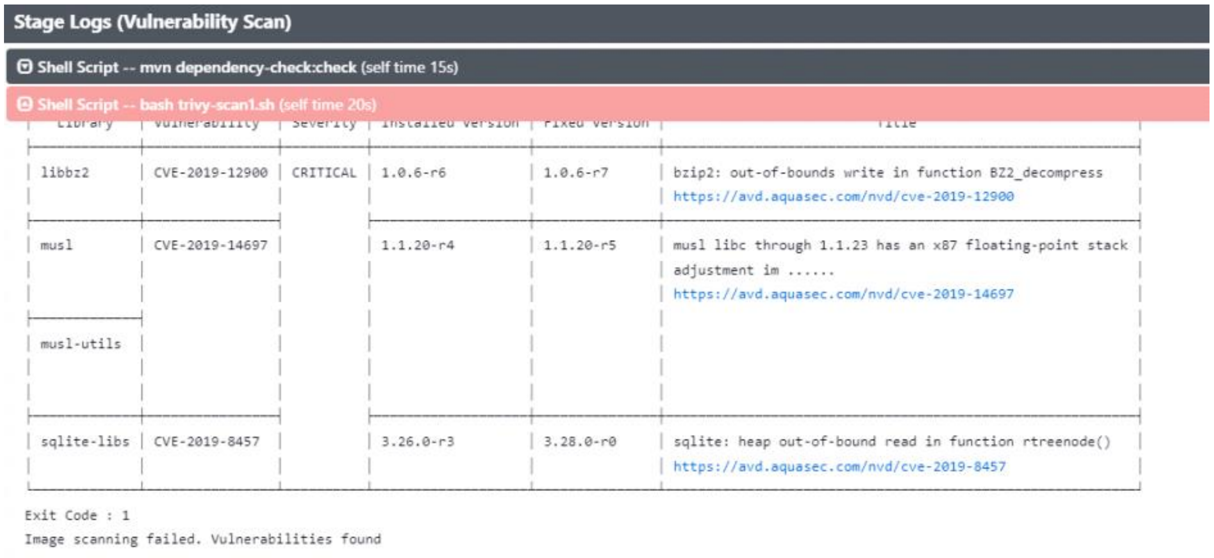
- **`awk`** is a command line utility used for text processing and pattern matching
- **`'NR==1 {print $2}'`** is the **`awk`** program provided as an argument, which performs the following actions:
- **`NR==1`** selects the first record in the input (i.e., the first line of the file)
- **`{print $2}`** prints the second field (i.e., a word or a substring separated by whitespace) of the selected record
- **`Dockerfile`** is the file being processed by **`awk`**

Overall, the command **`$(awk 'NR==1 {print $2}' Dockerfile)`** extracts the second word in the first line of the **`Dockerfile`** and returns it as a string value. The **`$()`** syntax is a Bash command substitution that evaluates the enclosed command and substitutes the output as a string.

Update pipeline

```
stage('Vulnerability Scan - docker'){
     steps {
       parallel(
         "Dependency Scan": {
          sh "mvn dependency-check:check"
        },
        "Trivy Scan": {
          sh "bash trivy-scan1.sh"
        }
      )
    }
  }
```

Result



Stage Logs (Vulnerability Scan)

Shell Script -- mvn dependency-check:check (self time 15s)

Shell Script -- bash trivy-scan1.sh (self time 20s)

```
|  Library   | Vulnerability  | Severity | Installed Version | Fixed Version |                         Title                          |
+------------+----------------+----------+-------------------+---------------+--------------------------------------------------------+
| libbz2     | CVE-2019-12900 | CRITICAL | 1.0.6-r6          | 1.0.6-r7      | bzip2: out-of-bounds write in function BZ2_decompress  |
|            |                |          |                   |               | https://avd.aquasec.com/nvd/cve-2019-12900             |
+------------+----------------+          +-------------------+---------------+--------------------------------------------------------+
| musl       | CVE-2019-14697 |          | 1.1.20-r4         | 1.1.20-r5     | musl libc through 1.1.23 has an x87 floating-point stack |
|            |                |          |                   |               | adjustment im ......                                   |
|            |                |          |                   |               | https://avd.aquasec.com/nvd/cve-2019-14697             |
+------------+                |          |                   |               |                                                        |
| musl-utils |                |          |                   |               |                                                        |
|            |                |          |                   |               |                                                        |
|            |                |          |                   |               |                                                        |
+------------+----------------+          +-------------------+---------------+--------------------------------------------------------+
| sqlite-libs| CVE-2019-8457  |          | 3.26.0-r3         | 3.28.0-r0     | sqlite: heap out-of-bound read in function rtreenode() |
|            |                |          |                   |               | https://avd.aquasec.com/nvd/cve-2019-8457              |
+------------+----------------+----------+-------------------+---------------+--------------------------------------------------------+
Exit Code : 1
Image scanning failed. Vulnerabilities found
```

we try run trivy to find vulnerability with the same os docker image like: openjdk, openjdk8, adoptopenjdk/openjdk8:alpine-slim

```
docker run --rm -v $WORKSPACE:/root/.cache/ aquasec/trivy:0.17.2 -q image --exit-code 0 --severity HIGH --light
$dockerImageName
```

And after have result with zero vulnerability. We update dockerfile to fix vulnerability

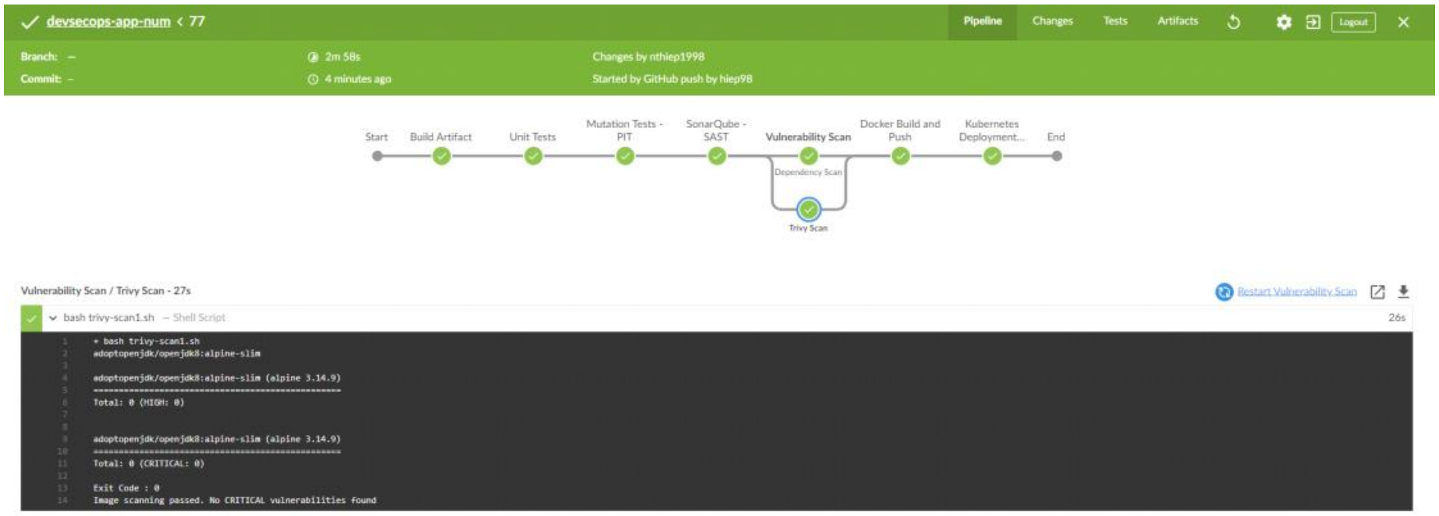
```
FROM adoptopenjdk/openjdk8:alpine-slim
EXPOSE 8080
ARG JAR_FILE=target/*.jar
ADD ${JAR_FILE} app.jar
ENTRYPOINT ["java","-jar","/app.jar"]
```

Update docker build command in build stage to fix error relate trivy:

```
stage('Docker Build and Push') {
     steps {
       withDockerRegistry([credentialsId: "docker-hub", url: ""]) {
         sh 'printenv'
         sh 'sudo docker build -t nthiep1998/numeric-app:""$GIT_COMMIT"" .'
```

```
        sh 'docker push nthiep1998/numeric-app:""$GIT_COMMIT""'
      }
    }
  }
```

Final Result



```
+ bash trivy-scan1.sh
adoptopenjdk/openjdk8:alpine-slim

adoptopenjdk/openjdk8:alpine-slim (alpine 3.14.9)
=================================================
Total: 0 (HIGH: 0)


adoptopenjdk/openjdk8:alpine-slim (alpine 3.14.9)
=================================================
Total: 0 (CRITICAL: 0)

Exit Code : 0
Image scanning passed. No CRITICAL vulnerabilities found
```