DevOps Engineer

Recruitment Challenge

Version 1.0

2021

Challenge Goals

This challenge has the goal to evaluate Devops Engineers applying to WIT. This challenge will be used only to evaluate the applicant's technical skills and the ability to develop a specific task in a specified timeframe. All the answers must be in English.

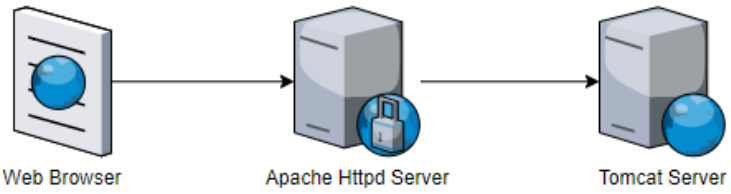
Description

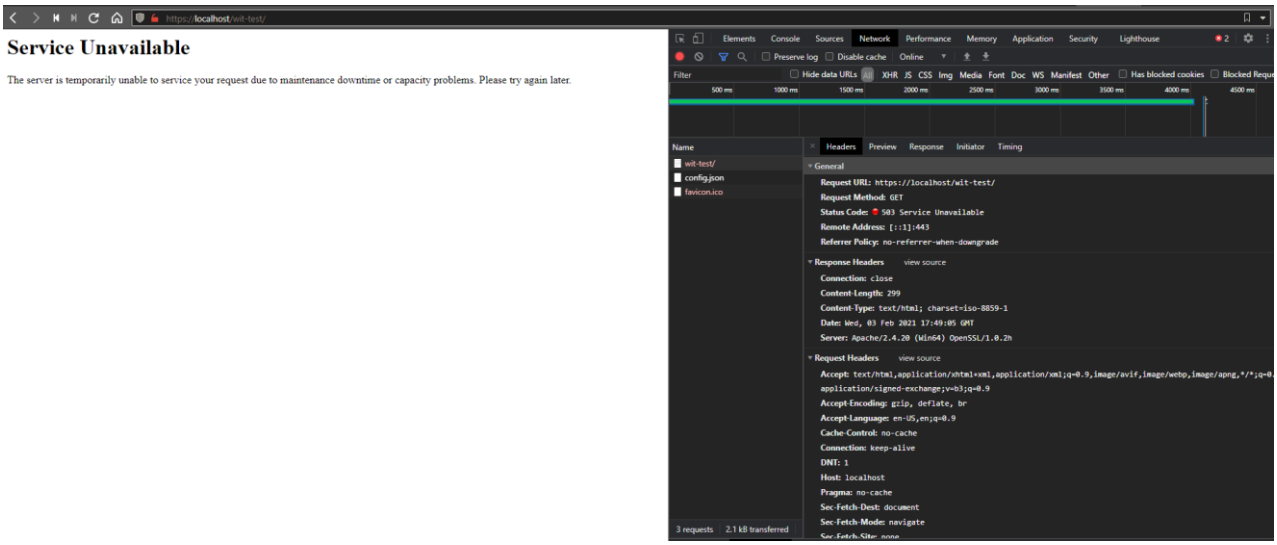
Part I – Debug systems issues

1. Analyse the following StackTrace and suggest what could be the possible root cause and what would be your first step to fix it.

```
2020-01-30 09:20:36.083 | ERROR |                                    | error retrieving all properties
javax.persistence.PersistenceException: Exception [EclipseLink-4002] (Eclipse Persistence Services - 2.6.0.v20150309-bf26070): org.eclipse.persistence.exceptions.DatabaseException
Internal Exception: java.sql.SQLRecoverableException: IO Error: The Network Adapter could not establish the connection
Error Code: 17002
Query: ReadAllQuery(name="Property.findAll" referenceClass=Property sql="SELECT                                  FROM PROPERTIES")
        at org.eclipse.persistence.internal.jpa.QueryImpl.getDetailedException(QueryImpl.java:382) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.jpa.QueryImpl.executeReadQuery(QueryImpl.java:260) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.jpa.QueryImpl.getResultList(QueryImpl.java:473) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        [redacted]
        at java.util.TimerThread.mainLoop(Timer.java:555) [na:1.8.0_162]
        at java.util.TimerThread.run(Timer.java:505) [na:1.8.0_162]
Caused by: org.eclipse.persistence.exceptions.DatabaseException:
Internal Exception: java.sql.SQLRecoverableException: IO Error: The Network Adapter could not establish the connection
Error Code: 17002
Query: ReadAllQuery(name="Property.findAll" referenceClass=Property sql="SELECT                                  FROM          ")
        at org.eclipse.persistence.exceptions.DatabaseException.sqlException(DatabaseException.java:331) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.exceptions.DatabaseException.sqlException(DatabaseException.java:326) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.DefaultConnector.connect(DefaultConnector.java:138) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.DatasourceLogin.connectToDatasource(DatasourceLogin.java:162) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.databaseaccess.DatasourceAccessor.connectInternal(DatasourceAccessor.java:346) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.databaseaccess.DatabaseAccessor.connectInternal(DatabaseAccessor.java:309) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.databaseaccess.DatasourceAccessor.connect(DatasourceAccessor.java:434) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.server.ConnectionPool.buildConnection(ConnectionPool.java:217) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.server.ConnectionPool.acquireConnection(ConnectionPool.java:136) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.server.ServerSession.getAccessors(ServerSession.java:538) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.server.ServerSession.executeCall(ServerSession.java:557) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.server.ClientSession.executeCall(ClientSession.java:258) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.queries.DatasourceCallQueryMechanism.executeCall(DatasourceCallQueryMechanism.java:242) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.queries.DatasourceCallQueryMechanism.executeCall(DatasourceCallQueryMechanism.java:228) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.queries.DatasourceCallQueryMechanism.executeSelectCall(DatasourceCallQueryMechanism.java:299) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.queries.DatasourceCallQueryMechanism.selectAllRows(DatasourceCallQueryMechanism.java:694) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.queries.ExpressionQueryMechanism.selectAllRowsFromTable(ExpressionQueryMechanism.java:2740) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.queries.ExpressionQueryMechanism.selectAllRows(ExpressionQueryMechanism.java:2693) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.queries.ReadAllQuery.executeObjectLevelReadQuery(ReadAllQuery.java:541) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.queries.ObjectLevelReadQuery.executeDatabaseQuery(ObjectLevelReadQuery.java:1173) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.queries.DatabaseQuery.execute(DatabaseQuery.java:904) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.queries.ObjectLevelReadQuery.execute(ObjectLevelReadQuery.java:1132) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.queries.ReadAllQuery.execute(ReadAllQuery.java:442) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.queries.ObjectLevelReadQuery.executeInUnitOfWork(ObjectLevelReadQuery.java:1220) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.sessions.UnitOfWorkImpl.internalExecuteQuery(UnitOfWorkImpl.java:2896) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.sessions.AbstractSession.executeQuery(AbstractSession.java:1857) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.sessions.AbstractSession.retryQuery(AbstractSession.java:1927) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.server.ClientSession.retryQuery(ClientSession.java:694) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.sessions.UnitOfWorkImpl.retryQuery(UnitOfWorkImpl.java:5536) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.sessions.AbstractSession.executeQuery(AbstractSession.java:1893) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.sessions.AbstractSession.retryQuery(AbstractSession.java:1927) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.sessions.server.ClientSession.retryQuery(ClientSession.java:694) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.sessions.UnitOfWorkImpl.retryQuery(UnitOfWorkImpl.java:5536) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
        at org.eclipse.persistence.internal.sessions.AbstractSession.executeQuery(AbstractSession.java:1893) ~[eclipselink-2.6.0.jar:2.6.0.v20150309-bf26070]
```

2. Consider the following infra-structure and the error that is being shown when accessing the HTTP server:





2.1. What would be your steps to diagnose the issue?
2.2. Identify some possible problems and explain how would you fix it?

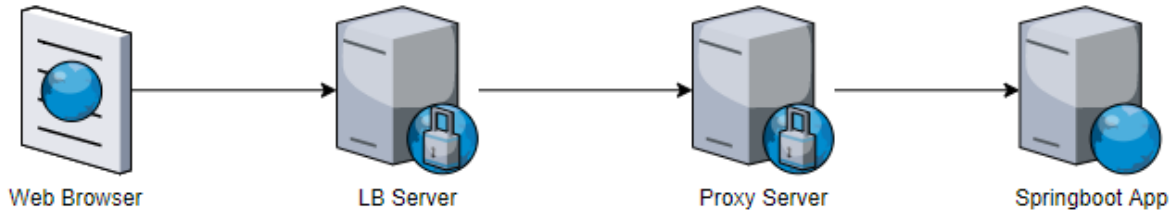
3. Analyse the following Terraform "apply" output, identify the problem and suggest a detailed solution.

```
Error: Reference to undeclared input variable

  on tags.tf line 5, in locals:
   5:     Environment     = var.ENV

An input variable with the name "ENV" has not been declared. This variable can
be declared with a variable "ENV" {} block.

Releasing state lock. This may take a few moments...
```

4. [AWS knowledge specific]: The privileges of the only Oracle RDS database user with admin on an AWS RDS Oracle database were changed to read-only by mistake. How is it possible to recover the write privileges for that user?

Part II – Linux Laboratory

Consider the Java SpringBoot service in attach to this challenge – "wit-cicd-challenge.jar".
Based on that service, setup a Docker environment to deploy the following infrastructure:



The final goal is to have the SpringBoot App (port 8080) exposed through the Load Balancer with the hostname "demowit.local".

The following request performed in the VirtualBox host machine:

curl http://demowit.local/wit-test/

And it must return:

Remarks:

- You may choose any Load Balancer server technology (HAProxy, Envoy, Traefik, etc…);
- You may choose any Proxy server technology (Apache, Nginx, Lighttpd, etc…);

Bonus Points:

- Use SSL on LB and/or Proxy servers (a self-signed certificate can be used);
- Use Docker volumes to store configurations on host server;
- Use Docker Compose and/or Docker Swarm;
- Use Docker images with optimized disk space usage;

Please read all instructions before beginning the lab.

- Install VirtualBox
- Create a VM and install CentOS Linux (or Stream)
  - you can download the ISO image from www.centos.org
- The operating system should **NOT** have graphical user interface
- Use the *wit-cicd-challenge-0.0.1-SNAPSHOT.jar* provided:
  - To execute, just run the jar file provided;
  - The execution will open a web server on port 8080 answering on "/";

The following is a list of requisites that need to be installed and configured:

1) Create a user “wit” and grant this user SUDO permissions
2) Install Docker
    a. install docker following the instructions in https://docs.docker.com/engine/install/centos/
3) Make sure that the “wit” user can access Docker without “sudo”

DELIVERABLES

Para a Part I – Debug systems issues:

1) Document with the answers to the 4 questions

Para a Part II – Linux Laboratory:

1) VM copy with the following requirements:
    a. The image must be compressed in order to take the less space possible in the disc;
    b. The image must be sent through file share services (wetransfer or similar);
    c. In case that you can’t do the upload to one of those services, please let us know so we can help you with our internal tool for this.
2) Detailed documentation describing the configuration and installation of the solution:
    a. All documentation must be written in english;
    b. Make sure that the document is clear and simple to read.
    c. The document must be able to explain clearly to the rest of the team how to install, configure and test the solution;
3) Access credentials must be sent in a separated document.

Evaluation Metrics

- Structure and quality of the answers
- Use correctly the above referred technologies.
- Quality of the solutions found

Deadline

The challenge result (link to the website and font code used) must be sent to the email: **jobs@wit-software.com**. You must use the following subject: “**Challenge DevOps**” and in the email’s body you must indicate the total number of hours used in this challenge.