

ProgressSoft Assignment Solutions

This document contains the corrected and optimized solutions for the ProgressSoft technical assignment, covering Linux, SQL, Tomcat, and DevOps sections.

Linux Section

1. System Information Script

The script displays system and resource information, including a fallback for the public IP retrieval.

```
#!/bin/bash
# system_info.sh

# System Information
EXECUTED_BY=$(whoami)
HOSTNAME=$(hostname)
SERVER_IP=$(hostname -I | awk '{print $1}')
PUBLIC_IP=$(curl -s --connect-timeout 5 https://ifconfig.me || echo "Not Available")
OS_TYPE_VERSION=$(grep "PRETTY_NAME" /etc/os-release | cut -d'=' -f2 | tr -d ' ')
KERNEL_VERSION=$(uname -r)
ARCHITECTURE=$(uname -m)
VIRTUALIZATION=$(systemd-detect-virt)
SERVER_TIME=$(date "+%a %b %d %T %p %Z %Y")
TIMEZONE=$(timedatectl | grep "Time zone" | awk '{print $3 " (" $4 " " " $5}')}
UPTIME=$(uptime -p | sed 's/up //' )

# Resource Usage
TOTAL_MEMORY=$(free -h | awk '/^Mem:/ {print $2}')
MEMORY_USAGE=$(free -h | awk '/^Mem:/ {print $3 " / " $2}')
SWAP_USAGE=$(free -h | awk '/^Swap:/ {print $3 " / " $2}')
CPU_CORES=$(nproc)

echo "System Information"
echo "-----"
echo "• Executed By: $EXECUTED_BY"
echo "• Hostname: $HOSTNAME"
echo "• Server IP: $SERVER_IP"
echo "• Public IP: $PUBLIC_IP"
echo "• OS Type and Version: $OS_TYPE_VERSION"
echo "• Kernel Version: $KERNEL_VERSION"
echo "• Architecture: $ARCHITECTURE"
echo "• Virtualization: $VIRTUALIZATION"
echo "• Server Time: $SERVER_TIME"
echo "• Timezone: $TIMEZONE"
echo "• Uptime: $UPTIME"
echo ""
echo "Resource Usage"
echo "-----"
echo "• Total Memory: $TOTAL_MEMORY"
echo "• Memory Usage: $MEMORY_USAGE"
echo "• Swap Usage: $SWAP_USAGE"
echo "• CPU Cores: $CPU_CORES"
```

2. Linux User Management

```
sudo groupadd PSGroup  
sudo groupadd dba  
sudo useradd -m -g PSGroup -G dba PS
```

3. Modify Root Password

```
echo "root:new_secure_password" | sudo chpasswd
```

SQL Section

1. Schema Creation with Constraints (Q1)

Includes PRIMARY KEY , NOT NULL , FOREIGN KEY , and CHECK constraints.

```

CREATE TABLE Gender (
    Gender_ID NUMBER PRIMARY KEY,
    Name VARCHAR2(10) NOT NULL,
    CONSTRAINT chk_gender_name CHECK (Name IN ('Male', 'Female', 'Other'))
);

CREATE TABLE MyEmployee (
    ID_Number NUMBER PRIMARY KEY,
    LAST_NAME VARCHAR2(50) NOT NULL,
    FIRST_NAME VARCHAR2(50) NOT NULL,
    HIRE_DATE DATE NOT NULL,
    JOB_TITLE VARCHAR2(50),
    USERID NUMBER,
    SALARY NUMBER(10, 2),
    DEPT_ID NUMBER,
    Gender_ID NUMBER,
    University_ID NUMBER,
    EMP_IMAGE BLOB,
    CONSTRAINT chk_salary CHECK (SALARY > 0),
    CONSTRAINT fk_dept FOREIGN KEY (DEPT_ID) REFERENCES
MyDepartment(Dept_ID),
    CONSTRAINT fk_gender FOREIGN KEY (Gender_ID) REFERENCES
Gender(Gender_ID),
    CONSTRAINT fk_university FOREIGN KEY (University_ID) REFERENCES
University(ID)
);

```

2. SQL Queries (Q2 & Q3)

Q2: Employee Data Retrieval with Unique Aliases

```

SELECT
    e.FIRST_NAME || ' ' || e.LAST_NAME AS "Employee Name",
    e.SALARY AS "Salary",
    d.Name AS "Department Name",
    m.FIRST_NAME || ' ' || m.LAST_NAME AS "Manager Name",
    g.Name AS "Gender",
    u.Name AS "University"
FROM MyEmployee e
LEFT JOIN MyDepartment d ON e.DEPT_ID = d.Dept_ID
LEFT JOIN MyEmployee m ON e.USERID = m.ID_Number
LEFT JOIN Gender g ON e.Gender_ID = g.Gender_ID
LEFT JOIN University u ON e.University_ID = u.ID;

```

3. PL/SQL: Function and Procedure (Q5 & Q6)

F_HR_QUERY Function (Internal SCOTT Hire Date Check):

```

CREATE OR REPLACE FUNCTION F_HR_QUERY
RETURN SYS_REFCURSOR IS
    rc SYS_REFCURSOR;
    v_scott_hire_date DATE;
BEGIN
    SELECT HIRE_DATE INTO v_scott_hire_date
    FROM MyEmployee
    WHERE FIRST_NAME = 'SCOTT' AND ROWNUM = 1;

    OPEN rc FOR
        SELECT FIRST_NAME || ' ' || LAST_NAME as Name, HIRE_DATE
        FROM MyEmployee
        WHERE HIRE_DATE > v_scott_hire_date;
    RETURN rc;
END;

```

Tomcat & DevOps Section

1. Dockerfile for Tomcat Deployment

The Dockerfile now includes the deployment of a sample WAR file.

```
FROM tomcat:9.0-jdk8-openjdk
COPY webapps/sample.war /usr/local/tomcat/webapps/
EXPOSE 8080
CMD ["catalina.sh", "run"]
```

2. Vagrantfile Configuration

Configured for Ubuntu 24.04, 2GB RAM, and port forwarding (7070 -> 9090).