Manual QA Engineer Take-Home Assignment

Overview

This assignment evaluates your manual testing skills for cloud infrastructure platforms. You'll be working with a Virtual Private Cloud (VPC) feature similar to AWS VPC, focusing on test case design, bug investigation, and end-to-end testing scenarios.

Time Allocation: 6-8 hours total **Submission Format:** Document(s) with clear sections for each deliverable

---

Part 1: Test Case Design (2-3 hours)

Feature Specification: VPC Creation

You are tasked with testing a new VPC creation feature with the following requirements:

Functional Requirements:

- Users can create a Virtual Private Cloud with a specified CIDR block
- CIDR block must be between /16 and /28 (e.g., 10.0.0.0/16, 192.168.1.0/24)
- VPC names must be 1-255 characters long, containing only alphanumeric characters, hyphens, and underscores
- Each account is limited to 5 VPCs per region
- VPC creation must complete within 30 seconds under normal conditions
- DNS resolution and DNS hostnames can be enabled or disabled (both optional)
- VPC must be created in a specific availability zone region

Technical Constraints:

- CIDR blocks cannot overlap with existing VPCs in the same region
- Private IP ranges only (10.0.0.0/8, 172.16.0.0/12, 192.168.0.0/16)
- System must handle concurrent VPC creation requests

User Interface:

- Web-based form with fields for VPC name, CIDR block, region selection, and DNS options
- Real-time validation for CIDR format
- Success/error messaging

Deliverables for Part 1:

1. **Comprehensive Test Cases** covering:
   - Positive/Happy path scenarios
   - Boundary value testing
   - Negative testing scenarios
   - Edge cases
   - Integration scenarios
2. **Test Case Format** should include:
   - Test case ID
   - Test case description
   - Pre-conditions
   - Test steps
   - Expected results
   - Priority (High/Medium/Low)
   - Category (Functional/UI/API/Performance/Security)

Part 2: Bug Investigation and Reporting (2-3 hours)

Scenario

You've been given access to a staging environment where users have reported issues with the VPC feature. Investigate the following problems and provide detailed bug reports.

Issue 1: "VPC Creation Sometimes Fails"

- **User Report:** "When I try to create a VPC with CIDR 10.0.0.0/16, it sometimes works and sometimes gives an error message 'Creation failed - please try again'"
- **Frequency:** Reported by 3 different users
- **Environment:** Staging environment, us-east-1 region
- **Additional Info:** Seems to happen more frequently during peak hours

Issue 2: "DNS Settings Not Working"

- **User Report:** "I enabled DNS resolution when creating my VPC, but instances can't resolve domain names"
- **Environment:** Staging environment, us-west-2 region
- **Additional Info:** User created VPC successfully, launched instances, but DNS queries fail

Issue 3: "CIDR Validation Inconsistency"

- **User Report:** "The system accepted my CIDR block 10.0.0.0/15 in the UI, but then failed during creation"
- **Environment:** Both staging and production
- **Additional Info:** Error occurs after form submission, not during real-time validation

Deliverables for Part 2:

For each issue, provide:

1. **Bug Report** including:
    - Bug title and description
    - Steps to reproduce
    - Expected vs actual behavior
    - Environment details
    - Severity assessment (Critical/High/Medium/Low)
    - Priority recommendation
    - Screenshots/logs if applicable
2. **Investigation Analysis:**
    - Potential root causes
    - Areas of the system that might be affected
    - Suggestions for verification testing
    - Risk assessment if left unfixed

Part 3: End-to-End Testing Strategy (2 hours)

Scenario: Multi-Tier Application Deployment

Design a comprehensive testing approach for the following user workflow:

Business Scenario: A development team wants to deploy a 3-tier web application with proper network isolation and security controls using your VPC feature.

Infrastructure Requirements:

1. Create a VPC (10.0.0.0/16) in us-east-1
2. Create three subnets:

- Public subnet (10.0.1.0/24) for load balancer
- Private subnet (10.0.2.0/24) for application servers
- Database subnet (10.0.3.0/24) for database

3. Configure Internet Gateway for public access
4. Set up NAT Gateway for private subnet outbound access
5. Create security groups for each tier with appropriate rules
6. Deploy Application Load Balancer in public subnet
7. Launch 2 application instances in private subnet
8. Set up RDS MySQL database in database subnet

Deliverables for Part 3:

1. **Test Strategy Document** including:
   - Testing approach overview
   - Test objectives and scope
   - Key testing scenarios
   - Risk assessment
   - Success criteria
2. **Detailed Test Plan** with:
   - Step-by-step execution plan
   - Validation checkpoints
   - Expected results at each stage
   - Rollback procedures if issues are found
3. **Testing Considerations** for:
   - Network connectivity between tiers

- Security isolation verification
- Performance and scalability aspects
- Integration points with other services

Part 4: API Testing Approach (1 hour)

VPC Management API

You have access to REST API endpoints for VPC management. Design test scenarios for the following API operations:

Available Endpoints:

```
POST /v1/vpcs
GET /v1/vpcs
GET /v1/vpcs/{vpc_id}
PUT /v1/vpcs/{vpc_id}
DELETE /v1/vpcs/{vpc_id}
```

Sample API Request:

```
json

POST /v1/vpcs
{
  "name": "my-vpc",
  "cidr_block": "10.0.0.0/16",
  "region": "us-east-1",
  "enable_dns_resolution": true,
  "enable_dns_hostnames": false
}
```

Deliverables for Part 4:

1. **API Test Scenarios** covering:
   - CRUD operations testing
   - Input validation
   - Authentication and authorization
   - Error handling
   - Rate limiting
   - Concurrent request handling
2. **Test Implementation Plan:**
   - Testing tools/framework recommendation
   - Test data setup requirements
   - Expected response codes and payloads
   - Performance baseline suggestions

Submission Guidelines

Format: Submit your work as a single document (PDF or Word) or organized folder structure with clear section headers.

Include:

- Your name and contact information
- Time spent on each section
- Any assumptions made
- Questions or clarifications needed
- Recommendations for improving the testing process

Evaluation Criteria:

- Technical accuracy and depth
- Systematic approach to testing
- Clear communication and documentation
- Understanding of cloud infrastructure concepts
- Problem-solving methodology
- Attention to detail

Questions? If you have any questions about the requirements or need clarifications, please don't hesitate to reach out.

Good luck!