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Course Project: Build a Troubleshooting Knowledge Base

Troubleshooting Knowledge Base

Project overview

Throughout this course, you will document the processes and techniques that you learn to successfully troubleshoot technical issues. The Troubleshooting Knowledge Base you create should include the problems you encounter while performing the hands-on labs and activities, and the issues you encounter while exploring AWS services on your own.

Your objective is to build your own troubleshooting knowledge base, so you can take this knowledge base with you at the end of the course and use it as a valuable resource in your career.

At the end of this project, you will be able to:

- **Describe** common technical challenges users face when they attempt to deploy, upgrade, and maintain AWS Cloud deployments
- **Explain** how to overcome specific technical challenges by confirming and adjusting deployment configurations as necessary
- **Present** troubleshooting techniques to stakeholders

The Excel spreadsheet template should be downloaded from here. A screen shot of it is shown in Figure 1. This template will help you organize and document issues, and record the resolution steps you performed. Each entry you create in the troubleshooting knowledge base will include the following details:

- Issue number
- Category
- Issue description
- Symptoms
- Root cause analysis (RCA)
- Resolution procedures
- Helpful tools or resources
- Comments

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Figure 1. Troubleshooting Knowledge Base template with sample entries

Issue #	Category	Issue Description	Symptoms	Root Cause Analysis	Resolution Procedures	Helpful Tools or Resources	Comments	
Ex. 1	Networking	Application on Amazon EC2 instance - connectivity issue	Could not connect to an existing web site. Was able to successfully connect yesterday. Tried different browsers and got the following errors: - Firefox: The connection has timed out The server at ec2-34-221-214-86.us-west-2.compute.amazonaws.com is taking too long to respond. - Chrome: This site can't be reached ec2-34-221-214-86.us-west-2.compute.amazonaws.com took too long to respond. ERR_CONNECTION_TIMED_OUT	The instance was no longer running. Perhaps someone stopped it and then it was restarted, because the URL to connect to it changed as well.	Use the Amazon EC2 dashboard to verify that the Amazon EC2 instance is running. If not, start it and try to connect again.	Amazon EC2 dashboard: - To view instance status, select **Instances** and look at **Instance State** in the details pane. - To start an instance: 1) Select the instance. 2) Select **Actions > Instance State > Start**. 3) Wait until Instance State shows *Running*.	Other things to check: - Is the URL correct? - Are any AWS services down in the target region? Check the AWS Service Health Dashboard at: https://status.aws.amazon.com/	example 1
Ex. 2	Networking	SSH to EC2 instance issue	Could not SSH to a running EC2 Instance. ssh -I key.pem ec2-user@publicip Received error "Network error: Connection timed out"	There were two issues. First, the permissions were not correctly set on the key pair. Also, the security group did not allow traffic on port 22.	1. verify the SSH key being use is one that the EC2 instance supports. 2. verify the SSH key has the correct permissions set (chmod 400). 3. verify the security group associated with the EC2 instance has TCP port 22 open for inbound traffic	https://aws.amazon.com/premiumsupport/knowledge-center/ec2-linux-ssh-troubleshooting/ and https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/TroubleshootingInstancesConnecting.html	Other things to check: is ec2-user the correct user to try to connect as? Does the laptop have internet access? (e.g., web pages load in a browser)? Did someone mess with the SSH settings on the instance I'm trying to connect to?	example 2
Ex. 3	Foundational IT	Out of disk space on an EC2 instance	application on an instance stopped running	The instance ran out of disk space	check available disk space. From a terminal: $ df -h	sudo find / -size +1G -ls or find / -name +200M -ls or find . -mmin -5	the find command helps locate which files are taking up so much space or which ones were modified recently (e.g. in the last 5 minutes)	example 3
Ex. 4	Foundational IT	Linux service stopped running	web page hosted on an instance was not loading (page not found error)	the web server wasn't running	check the web server process status $ sudo service httpd status and if it is not running start it $ sudo service httpd start	/var/log/apache or /var/log/httpd	It may be helpful to look at the web server log file if the web server won't start.	example 4

Groups

Your instructor will organize the class into groups—or teams—to provide opportunities for you to discuss, compare, and evaluate different approaches to resolving common cloud deployment challenges. By working with a group, you are likely to develop more comprehensive solutions, while solving technical issues with the various perspectives.

At the end of the course, each group will be asked to present their findings in one of the knowledge base categories, with the exception for the IT foundations category.

> **NOTE:** Teams will not know which category they will be asked to present until the last week of class; therefore, be sure to add entries to all categories as the course progresses.

You will submit your completed version of the Troubleshooting Knowledge Base to your instructor at the end of the course.

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Knowledge base categories

Your knowledge base should have many entries in it by the end of this course. To organize your knowledge base entries, tag each one with the appropriate category and service or technology. Table 1 shows each knowledge base category with applicable AWS products and services.

Table 1. Troubleshooting Knowledge Base Entry Categories

Category	AWS Products and Services	Example Troubleshooting Topics
Storage and Data Management	Amazon Simple Storage Service (Amazon S3) Amazon Elastic File System (Amazon EFS) Amazon S3 Glacier Amazon Elastic Block Store (Amazon EBS), instance store volumes Snapshots Amazon Relational Database Service (Amazon RDS) Amazon DynamoDB Amazon Redshift	Troubleshooting a person's access to S3 objects Troubleshooting AWS CLI access to S3 Uploading files to or downloading files from S3 using the AWS CLI Importing data to S3 or exporting data from S3 Mounting EFS on an EC2 instance volume Configuring data lifecycle migration from EC2 to Glacier Increasing the size of an EBS volume on an EC2 instance Attaching an additional EBS volume to an EC2 instance and mount it Creating snapshots Restoring snapshots Accessing to RDS database Importing data to RDS or exporting data from RDS Adding a column to a database table Querying a database table and limiting the result set
Security and Compliance	• AWS Identity and Access Management (IAM • Security groups • Key pairs • Security credentials • AWS Trusted Advisor • TLS/SSL (HTTPS) • Encryption • Authentication • Authorization Access Control Lists (ACLs)	• Troubleshooting an IAM user's ability to log in to the AWS Management Console • Updating the rights granted to an IAM user or group • Activating or deactivate an IAM user's programmatic access • Activating or deactivating an IAM user's AWS Management Console access • Enabling multi-factor authentication (MFA) • Setting password complexity requirements
Networking	• Amazon VPC • Subnets • Amazon Route 53 • Amazon API Gateway • Security groups	• Creating multiple subnets in a single Amazon VPC • Configuring a private subnet versus a public subnet • Troubleshooting access to a webpage running on an EC2 instance • Limiting access to specific TCP ports and specific IP address ranges • Configuring failover routing

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Category	AWS Products and Services	Example Troubleshooting Topics
		Mapping a domain name to an IP address
Automation and Optimization	AWS CloudFormation AWS Systems Manager Amazon EC2 Auto Scaling AWS Step Functions AWS Trusted Advisor	Creating an Amazon VPC with subnets using AWS CloudFormation Accessing EC2 instance shell through the AWS Management Console (web UI) Configuring Auto Scaling based on changes in CPU use
Compute	• Amazon Elastic Compute Cloud (Amazon EC2) • Amazon Elastic Container Service (ECS) • Docker • Kubernetes • AWS Lambda	• Launching an EC2 instance using the AWS CLI • Launching a container that runs a web server • Triggering a Lambda function • Creating and using EC2 templates • Creating an AMI • Copying an AMI to another Region Granting access to other AWS services to applications running on an EC2 instance
Monitoring and Reporting	• Amazon CloudWatch • Amazon Simple Notification Service (SNS) • Amazon Simple Queue Service (SQS) AWS CloudTrail	• Auditing user actions on your AWS account • Configuring email alerts • Triggering a CloudWatch alert when storage capacity on an EC2 instance gets low • Creating an SNS
Foundational IT	• Linux OS configuration • Reading log files • VI editor • Bash scripting • Python SQL and database management topics	• Discovering remaining disk space on an EC2 instance • Discovering CPU use on an EC2 instance • Discovering memory on an EC2 instance

Getting started

To begin your Troubleshooting Knowledge Base, create a copy of the spreadsheet template and rename it by adding your name to the end of the file name. For example, rename it to: *Troubleshooting Knowledge Base-**Jane Doe**.xlsx*

Project details

As you encounter and troubleshoot issues, document your findings in your Troubleshooting Knowledge Base spreadsheet. Use the following guidelines to create your spreadsheet:

- Create a new row in the spreadsheet to document a new issue.
- Enter the relevant information in the appropriate columns.
- Refer to Table 2 for column descriptions.
- Provide enough detail so you or someone in a SysOps role can easily understand the issue and resolution steps.
- Remember that issues can be in the context of performing a lab or exercise, or when you are exploring AWS on your own. Your instructor might provide time at the end of each module for you to work on your project.
- Identify and document any tools, online documentation, or other resources that you used to resolve an issue.
- Do not create duplicate entries for different occurrences of the same issue:
    - Use the spreadsheet's Find function to check if an issue has already been documented
    - Make enhancements to existing entries as needed

Troubleshooting knowledge base template description

The template file is named ***Troubleshooting Knowledge Base.xlsx***; it contains a tab named Knowledge Base Entries. Table 2 describes each column in the template.

Table 2. Template Column Descriptions

Column Name	Description
Issue #	Each time you create a new issue, assign a unique number to it. This is like a primary key for your database. Increment the number by one for each new entry.
Category	Categorize each entry into one of the seven categories described in Table 1. Every entry should be categorized.
Issue Description	Provide a high-level description of the entry.
Symptom or Issue	Clearly describe each symptom or issue that you encounter. Provide as much detail as needed to identify the symptoms of the problem. This includes: • Error codes • Error messages • Sequence of events that led to the error (problem context)
Root Cause Analysis (RCA)	Describe what ended up being the cause of the problem. How did you arrive at your conclusion?
Resolution Procedures	Given what you know now, what would be the most efficient way to solve the problem if you encounter it again? List the steps to follow to resolve the problem. Use action verbs to provide additional context.

Column Name	Description
	If you checked other relevant configurations that could have been the cause of the problem, even if they ended up not being the issue you faced, list those as well. The idea is to have a referenceable list of the most likely causes to confirm and check. You do not need to write full sentences, create an outline instead.

Helpful Tools or Resources	If you discovered any helpful tools or resources in the process of resolving an issue, add links to those resources in this column.
	
	Include:
	
	• How to access the resource if applicable. For example:
	  ○ URL of an online documentation resource
	  ○ Location path of a log file
	  ○ Name of someone you talked to who is an expert on the subject
	• Specific steps that you followed when using the tool. For example, A command that you issued from a terminal that revealed helpful information

Comments	Provide any additional comments that can further clarify your solution or approach to resolving the issue. In addition, you can optionally describe alternate solutions or additional steps to try.

Final project presentations

Towards the end of the course, your instructor will assign each group to present on one of the knowledge base categories, with the exception of the Foundational IT category. This will allow the class to hear one presentation on each category.

Your instructor will provide the groups time to prepare for the presentations.

Each group should select at least two members of the team to present. Presentations should last between 8 and 10 minutes per team.

> **NOTE:** Presentations might include slides, live demo, or recorded demo. You can also project the knowledge base document for the class to see during your presentation.

A rubric will be used to assess your presentations (see Appendix A). The rubric focuses on competency levels in each category associated with the listed criteria. It provides an opportunity for self-reflection that can be used in future solution designs and conversations with customers. Before preparing your presentation, you should review the rubric to learn what distinguishes a high-quality presentation from a satisfactory presentation.

Be prepared to answer questions from your instructor and from other students at the end of your presentation. The class might engage in a discussion of the topic presented. This will be a great time to share ideas.

On completion of the project, each team member should submit a copy of your knowledge base spreadsheet with multiple entries in all seven categories filled in.

If you have any questions regarding this course project, ask your instructor for clarification. Enjoy the project and good luck!