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About the Author

At the impressionable age of 14, **William "Bo" Rothwell** crossed paths with a TRS-80 Micro Computer System (affectionately known as a "Trash 80"). Soon after, the adults responsible for Bo made the mistake of leaving him alone with the TSR-80. He immediately dismantled it and held his first computer class, showing his friends what made this "computer thing" work. Since that experience, Bo's passion for understanding how computers work and sharing this knowledge with others has resulted in a rewarding career in IT training. His experience includes cloud, Linux, UNIX, IT security, DevOps, and programming languages such as Perl, Python, Tcl, and BASH. He is the founder and lead instructor of One Course Source, an IT training organization.

Dedication

To my sister, Betsy, who I tormented so much growing up. I'm glad that now we are adults you have either forgotten or forgiven my misdeeds.

To my parents: 99.7 percent of the time Betsy confessed and got in trouble, it was really me.

To my childhood dog, Hansel, thank you for always being there, under the dining room table, when I needed vegetables to disappear from my plate. You learned to chew silently, and for that, I was grateful.

To my seventh-grade homeroom teacher, you know who you are. You said I was lazy and would never amount to anything. If you are reading this now, you have concrete proof in your hands that you were mistaken.

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I always worry when I write this section that I will miss someone who has helped me with this book. It takes a team to write a book, but often the author gets all of the credit. For all of the editors and support staff who have helped make this book possible, thank you very much.

About the Technical Reviewer

Akhil Behl, CCIE Emeritus No. 19564, is a passionate IT executive with a key focus on the cloud and security. He has 18+ years of experience in the IT industry working across several leadership, advisory, consultancy, and business development profiles with various organizations. His technology and business specializations include cloud, security, infrastructure, data center, and business communication technologies. Currently, he leads business development for the cloud for a global systems integrator.

Akhil has written multiple titles on security and business communication technologies. In addition, he has contributed as technical editor for more than a dozen books on security, networking, and information technology. He also has published four books with Pearson Education/Cisco Press.

He has published several research papers in national and international journals, including *IEEE Xplore*, and presented at various IEEE conferences, as well as other prominent ICT, security, and telecom events. Writing and mentoring are his passion and a part of his life.

He holds CCIE Emeritus (Collaboration and Security), Azure Solutions Architect Expert, Google Professional Cloud Architect, Azure AI Certified Associate, Azure Data Fundamentals, CCSK, CHFI, PMP, ITIL, VCP, TOGAF, CEH, ISM, CCDP, and many other industry certifications. He has a bachelor's degree in technology and a master's of business administration degree.

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Introduction

Welcome to *CompTIA Cloud+ CV0-003 Exam Cram*. This book will help you get ready to take and pass the CompTIA Cloud+ exam CV0-003.

This book is designed to remind you of everything you need to know to pass the CV0-003 certification exam. Each chapter includes a number of practice questions that should give you a reasonably accurate assessment of your knowledge, and, yes, we've provided the answers and their explanations for these questions. Read this book, understand the material, and you'll stand a very good chance of passing the real test.

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Let's begin by looking at preparation for the exam.

How to Prepare for the Exam

This text follows the official exam objectives closely to help ensure your success. The CompTIA exam covers 5 domains and 27 objectives, and this book is aligned with those domains and objectives. These official objectives from CompTIA can be found here:

> https://www.comptia.org/training/resources/exam-objectives

As you examine the numerous exam topics now covered in Cloud+, resist the urge to panic! This book you are holding will provide you with the knowledge (and confidence) that you need to succeed. You just need to make sure you read it and follow the guidance it provides throughout your Cloud+ journey.

Practice Tests

This book is filled with practice exam questions to get you ready!

- **CramSaver questions at the beginning of each chapter:** These difficult, open-ended questions ensure you really know the material. Some readers use these questions to "test out" of a particular topic.

- **CramQuizzes at the end of each chapter:** These quizzes provide another chance to demonstrate your knowledge after completing a chapter.

In addition, the book includes two full practice tests in the Pearson Test Prep software available to you either online or as an offline Windows application. To access the practice exams, please see the instructions in the card inserted in the sleeve in the back of the book. This card includes a unique access code that enables you to activate your exams in the Pearson Test Prep software.

If you are interested in more practice exams than are provided with this book, Pearson IT Certification publishes a Premium Edition eBook and Practice Test product. In addition to providing you with three eBook files (EPUB, PDF, and Kindle), this product provides you with two additional exams' worth of questions. The Premium Edition version also offers you a link to the specific section in the book that presents an overview of the topic covered in the question, allowing you to easily refresh your knowledge. The insert card in the back of the book includes a special offer for an 80 percent discount off this Premium Edition eBook and Practice Test product, which is an incredible deal.

Taking a Certification Exam

After you prepare for your exam, you need to register with a testing center. At the time of this writing, the cost to take the Cloud+ exam is $338 USD for individuals. Students in the United States are eligible for a significant discount. Additionally, check with your employer because many workplaces provide reimbursement programs for certification exams. For more information about these discounts, you can contact a local CompTIA sales representative, who can answer any questions you might have. If you don't pass, you can take the exam again for the same cost as the first attempt until you pass. The test is administered by Pearson VUE testing centers with locations globally. In addition, the CompTIA Cloud+ certification might fulfill requirements for many within the U.S. military, and testing centers are available on some military bases.

You will have 90 minutes to complete the exam. The exam consists of a maximum of 90 questions. If you have prepared, you should find that this is plenty of time to properly pace yourself and review the exam before submission.

Arriving at the Exam Location

As with any examination, arrive at the testing center early (at least 15 minutes). Be prepared! You need to bring two forms of identification (one with a picture). The testing center staff requires proof that you are who you say you are and that someone else is not taking the test for you. Arrive early, because if you are late, you will be barred from entry and will not receive a refund for the cost of the exam.

ExamAlert

You'll be spending a lot of time in the exam room. Plan on using the full 90 minutes allotted for your exam and surveys. Policies differ from location to location regarding bathroom breaks. Check with the testing center before beginning the exam.

In the Testing Center

You will not be allowed to take into the examination room study materials or anything else that could raise suspicion that you're cheating. This includes practice test material, books, exam prep guides, or other test aids. The Testing Center will provide you with scratch paper and a pen or pencil. These days, this often comes in the form of an erasable whiteboard.

Examination results are available after the exam. After submitting the exam, you will be notified whether you have passed or failed. The test administrator will also provide you with a printout of your results.

About This Book

The ideal reader for an *Exam Cram* book is someone seeking certification. However, it should be noted that an *Exam Cram* book is a very easily readable, rapid presentation of facts. Therefore, an *Exam Cram* book is also extremely useful as a quick reference manual.

You can read this book cover to cover, or you may jump across chapters as needed. Because the book chapters align with the exam objectives, some chapters may have overlap on topics. Where required, references to the other chapters are provided for you. If you need to brush up on a topic, you can use the index, table of contents, or Table I.1 to find the topics and go to the questions that you need to study. Beyond helping you prepare for the test, we think you'll find this book useful as a tightly focused reference on some of the most important aspects of the Cloud+ certification.

This book includes other helpful elements in addition to the actual logical, step-by-step learning progression of the chapters themselves. *Exam Cram* books use elements such as ExamAlerts, tips, notes, and practice questions to make information easier to read and absorb. This text also includes a very helpful glossary to assist you.

Note

Reading this book from start to finish is not necessary; this book is set up so that you can quickly jump back and forth to find sections you need to study.

Use the *CramSheet* found in the front of the book to remember last-minute facts immediately before the exam. Use the practice questions to test your knowledge. You can always brush up on specific topics in detail by referring to the table of contents and the index. Even after you achieve certification, you can use this book as a rapid-access reference manual.

Exam Objectives

Table I.1 lists the skills the CV0-003 exam measures and the chapter in which the objective is discussed.

TABLE I.1

Exam Domain	Objective	Chapter in Book That Covers It
1.0 Cloud Architecture and Design	1.1 Compare and contrast the different types of cloud models.	Chapter 1
1.0 Cloud Architecture and Design	1.2 Explain the factors that contribute to capacity planning.	Chapter 2
1.0 Cloud Architecture and Design	1.3 Explain the importance of high availability and scaling in cloud environments.	Chapter 3
1.0 Cloud Architecture and Design	1.4 Given a scenario, analyze the solution design in support of the business requirements.	Chapter 4
2.0 Security	2.1 Given a scenario, configure identity and access management.	Chapter 5
2.0 Security	2.2 Given a scenario, secure a network in a cloud environment.	Chapter 6

Exam Domain	Objective	Chapter in Book That Covers It
2.0 Security	2.3 Given a scenario, apply the appropriate OS and application security controls.	Chapter 7
2.0 Security	2.4 Given a scenario, apply data security and compliance controls in cloud environments.	Chapter 8
2.0 Security	2.5 Given a scenario, implement measures to meet security requirements.	Chapter 9
2.0 Security	2.6 Explain the importance of incident response procedures.	Chapter 10
3.0 Deployment	3.1 Given a scenario, integrate components into a cloud solution.	Chapter 11
3.0 Deployment	3.2 Given a scenario, provision storage in cloud environments.	Chapter 12
3.0 Deployment	3.3 Given a scenario, deploy cloud networking solutions.	Chapter 13
3.0 Deployment	3.4 Given a scenario, configure the appropriate compute sizing for a deployment.	Chapter 14
3.0 Deployment	3.5 Given a scenario, perform cloud migrations.	Chapter 15
4.0 Operations and Support	4.1 Given a scenario, configure logging, monitoring, and alerting to maintain operational status.	Chapter 16
4.0 Operations and Support	4.2 Given a scenario, maintain efficient operation of a cloud environment.	Chapter 17
4.0 Operations and Support	4.3 Given a scenario, optimize cloud environments.	Chapter 18
4.0 Operations and Support	4.4 Given a scenario, apply proper automation and orchestration techniques.	Chapter 19
4.0 Operations and Support	4.5 Given a scenario, perform appropriate backup and restore operations.	Chapter 20
4.0 Operations and Support	4.6 Given a scenario, perform disaster recovery tasks.	Chapter 21
5.0 Troubleshooting	5.1 Given a scenario, use the troubleshooting methodology to resolve cloud-related issues.	Chapter 22
5.0 Troubleshooting	5.2 Given a scenario, troubleshoot security issues.	Chapter 23

Exam Domain	Objective	Chapter in Book That Covers It
5.0 Troubleshooting	5.3 Given a scenario, troubleshoot deployment issues. 5.6 Given a scenario, troubleshoot automation or orchestration issues.	Chapter 24
5.0 Troubleshooting	5.4 Given a scenario, troubleshoot connectivity issues. 5.5 Given a scenario, troubleshoot common performance issues.	Chapter 25

The Chapter Elements

Each *Exam Cram* book has chapters that follow a predefined structure. This structure makes *Exam Cram* books easy to read and provides a familiar format for all *Exam Cram* books. The following elements typically are used:

- Chapter topics
- Essential Terms and Components
- CramSavers
- CramQuizzes
- Notes
- Available exam preparation software practice questions and answers

Note

Bulleted lists, numbered lists, tables, and graphics are also used where appropriate. A picture can paint a thousand words sometimes, and tables can help to associate different elements with each other visually.

Now let's look at each of the elements in detail.

- **Chapter topics**—Each chapter contains details of all subject matter listed in the table of contents for that particular chapter. The objective of an *Exam Cram* book is to cover all the important facts without giving too much detail; it is an exam cram.
- **CramSavers**—Each chapter kicks off with a short-answer quiz to help you assess your knowledge of the chapter topic. This chapter element is designed to help you determine whether you need to read the whole

chapter in detail or merely skim the material and skip ahead to the CramQuiz at the end of the chapter.

- **CramQuizzes**—Each chapter concludes with a multiple-choice quiz to help ensure that you have gained familiarity with the chapter content.
- **ExamAlerts**—ExamAlerts address exam-specific, exam-related information. An ExamAlert addresses content that is particularly important, tricky, or likely to appear on the exam. An ExamAlert looks like this:

ExamAlert

Make sure you remember the different ways in which you can access a router remotely. Know which methods are secure and which are not.

- **Notes**—Notes typically contain useful information that is not directly related to the current topic under consideration. To avoid breaking up the flow of the text, they are set off from the regular text.

Note

This is a note. You have already seen several notes.

Other Book Elements

Most of this *Exam Cram* book on Cloud+ follows the consistent chapter structure already described. However, various important elements are not part of the standard chapter format. These elements apply to the book as a whole.

- **Glossary**—The glossary contains a listing of important terms used in this book with explanations.
- **CramSheet**—The CramSheet is a quick-reference, tear-out cardboard sheet of important facts useful for last-minute preparation. CramSheets often include a simple summary of the facts that are most difficult to remember.
- **Companion website**—The companion website for your book allows you to access several digital assets that come with your book, including
  - Pearson Test Prep software (both online and Windows desktop versions)
  - Key Terms Flash Cards application
  - A PDF version of the CramSheet

To access the book's companion website, simply follow these steps:

1. Register your book by going to: PearsonITCertification.com/register and entering the ISBN: 9780137393251.
2. Respond to the challenge questions.
3. Go to your account page and select the **Registered Products** tab.
4. Click the **Access Bonus Content** link under the product listing.

Pearson Test Prep Practice Test Software

As noted previously, this book comes complete with the Pearson Test Prep practice test software containing two full exams. These practice tests are available to you either online or as an offline Windows application. To access the practice exams that were developed with this book, please see the instructions in the card inserted in the sleeve in the back of the book. This card includes a unique access code that enables you to activate your exams in the Pearson Test Prep software.

Accessing the Pearson Test Prep Software Online

The online version of this software can be used on any device with a browser and connectivity to the Internet, including desktop machines, tablets, and smartphones. To start using your practice exams online, simply follow these steps:

1. Go to http://www.PearsonTestPrep.com.
2. Select **Pearson IT Certification** as your product group.
3. Enter your email/password for your account. If you don't have an account on PearsonITCertification.com or CiscoPress.com, you will need to establish one by going to PearsonITCertification.com/join.
4. In the **My Products** tab, click the **Activate New Product** button.
5. Enter the access code printed on the insert card in the back of your book to activate your product.

6. The product will now be listed in your My Products page. Click the **Exams** button to launch the exam settings screen and start your exam.

Accessing the Pearson Test Prep Software Offline

If you wish to study offline, you can download and install the Windows version of the Pearson Test Prep software. There is a download link for this software on the book's companion website, or you can just enter this link in your browser:

http://www.pearsonitcertification.com/content/downloads/pcpt/engine.zip

To access the book's companion website and the software, simply follow these steps:

1. Register your book by going to PearsonITCertification.com/register and entering the ISBN: 9780137393251.
2. Respond to the challenge questions.
3. Go to your account page and select the **Registered Products** tab.
4. Click the **Access Bonus Content** link under the product listing.
5. Click the **Install Pearson Test Prep Desktop Version** link under the Practice Exams section of the page to download the software.
6. After the software finishes downloading, unzip all the files on your computer.
7. Double-click the application file to start the installation, and follow the on-screen instructions to complete the registration.
8. When the installation is complete, launch the application and select the **Activate Exam** button on the My Products tab.
9. Click the **Activate a Product** button in the Activate Product Wizard.
10. Enter the unique access code found on the card in the sleeve in the back of your book and click the **Activate** button.
11. Click **Next** and then the **Finish** button to download the exam data to your application.
12. You can now start using the practice exams by selecting the product and clicking the **Open Exam** button to open the exam settings screen.

Note that the offline and online versions will synch together, so saved exams and grade results recorded on one version will be available to you on the other as well.

Customizing Your Exams

Once you are in the exam settings screen, you can choose to take exams in one of three modes:

- Study Mode
- Practice Exam Mode
- Flash Card Mode

Study Mode allows you to fully customize your exams and review answers as you are taking the exam. This is typically the mode you would use first to assess your knowledge and identify information gaps. Practice Exam Mode locks certain customization options because it is presenting a realistic exam experience. Use this mode when you are preparing to test your exam readiness. Flash Card Mode strips out the answers and presents you with only the question stem. This mode is great for late stage preparation when you really want to challenge yourself to provide answers without the benefit of seeing multiple-choice options. This mode will not provide the detailed score reports that the other two modes will, so it should not be used if you are trying to identify knowledge gaps.

In addition to these three modes, you will be able to select the source of your questions. You can choose to take exams that cover all of the chapters, or you can narrow your selection to just a single chapter or the chapters that make up specific parts in the book. All chapters are selected by default. If you want to narrow your focus to individual chapters, simply deselect all the chapters and then select only those on which you wish to focus in the Objectives area.

There are several other customizations you can make to your exam from the exam settings screen, such as the time of the exam, the number of questions served up, whether to randomize questions and answers, whether to show the number of correct answers for multiple-answer questions, or whether to serve up only specific types of questions. You can also create custom test banks by selecting only questions that you have marked or questions on which you have added notes.

Updating Your Exams

If you are using the online version of the Pearson Test Prep software, you should always have access to the latest version of the software as well as the exam data. If you are using the Windows desktop version, every time you launch the software, it will check to see if there are any updates to your exam data and automatically download any changes that were made since the last time you used the software. This requires that you are connected to the Internet at the time you launch the software.

Sometimes, due to many factors, the exam data may not fully download when you activate your exam. If you find that figures or exhibits are missing, you may need to manually update your exams.

To update a particular exam you have already activated and downloaded, simply select the **Tools** tab and select the **Update Products** button. Again, this is an issue only with the Windows desktop application.

If you wish to check for updates to the Pearson Test Prep exam engine software, Windows desktop version, simply select the **Tools** tab and select the **Update Application** button. This will ensure you are running the latest version of the software engine.

Contacting the Author

Hopefully, this book provides you with the tools you need to pass the Cloud+ exam. Feedback is appreciated. You can follow and contact the author on LinkedIn: https://www.linkedin.com/in/bo-rothwell/.

CHAPTER 8

Data Security and Compliance Controls in Cloud Environments

This chapter covers the following official CompTIA Cloud+ exam objective:

- ▶ 2.4 Given a scenario, apply data security and compliance controls in cloud environments.

(For more information on the official CompTIA Cloud+ exam topics, see the Introduction.)

In this chapter you will learn about different data security and compliance controls that are available in cloud environments. You will learn about how encryption and integrity affect an organization's data. You will also learn how to secure data by classifying and segmenting the data, as well as controlling access to the data.

Also discussed in this chapter is how laws and regulations impact data security, including the concept of a legal host. Lastly, you will learn about records management, a process in which rules are put in place to determine how long data is maintained and how to properly destroy the data when it is no longer needed.

CramSaver

If you can correctly answer these questions before going through this section, save time by skimming the ExamAlerts in this section and then completing the CramQuiz at the end of the section.

1. Data at rest and data in transit are two forms of data encryption. What is the third?
2. A _____ algorithm is a mathematical function that is applied to data that should return a unique result.

3. True or false: Data classification may be dependent on who can view the data.
4. In relation to data security, data _____ is the process of placing data into different locations based on who should be able to access the data.

Answers

1. Data in use
2. Hashing
3. True
4. Segmentation

Encryption

Encryption is the process of transforming data from its original form to a form that, when viewed, does not reveal the original data. There are three different forms of encryption:

- **Data at rest:** Data is encrypted when it is stored. This method can either be performed by you prior to uploading the data to storage, or in some cases, it can be performed by a function that is provided by the cloud provider. When you perform the data encryption, it is your responsibility to decrypt the data when the original data is needed. When the cloud provider encrypts the data, the decryption process must be performed by the cloud provider.
- **Data in transit:** Data is encrypted before it is sent and decrypted when received. This form of encryption could involve several different techniques, but in most cases for cloud computing environments it means that the data is encrypted by a network device that then sends the data across the network.
- **Data in use:** Data is encrypted when being actively used, which typically means while it is stored in random-access memory (RAM). Because some exploits may make data in RAM vulnerable, this form of encryption may be very important to ensuring data integrity.

Many different technologies can be used to encrypt data, and which technology you use will depend on several factors, including which cloud provider you utilize. These technologies fall into one of two methods of encryption:

- **Symmetric encryption:** With this method you use the same key (a unique value of some sort) to both encrypt and decrypt the data.
- **Asymmetric encryption:** With this method you use a different key to encrypt and decrypt the data. One key is referred to as the *public key*, and the other is called the *private key*. An example of using this encryption method would be if you wanted someone to send data to you across the network. You provide the public key to this person, and this person then encrypts the data. The only way to decrypt the data is to use the private key, which you would never share with anyone else.

Integrity

While data encryption is focused on keeping prying eyes from seeing the original data, data *integrity* is focused on assuring the data is accurate and consistent. Doing so requires ensuring data integrity through all stages of the data lifecycle, which includes transporting, storing, retrieving, and processing data.

Several tools can be used to ensure data integrity, including hashing algorithms, digital signatures, and file integrity monitoring (FIM).

Hashing Algorithms

A *hashing algorithm* is a mathematical function that is applied to data that should return a unique result. Unlike encryption, in which the result of the encryption process is data that could be decrypted back to the original format, hash data is one-way, making it impossible to return the original data. The purpose of a hash isn't to hide or encrypt the data, but rather to ensure that the data you have received matches up with the original.

Consider a situation in which you receive a database with sensitive information. Your organization is going to use this information to help make some critical decisions on future products. You received this data from a trusted third-party source, but how can you be certain that a "bad actor" didn't intercept the data and inject false information?

Your third-party source could use a hashing algorithm and send the resulting hash separately. Then you could take the data that you have received, perform the same hashing algorithm, and then compare the results with the hash from the third-party. If they match, you know you have unaltered data.

There are many different types of hashing algorithms. Each has specific advantages and disadvantages, but for the CompTIA Cloud+ certification exam, you should be familiar with the names of these algorithms:

- MD5
- SHA-1
- SHA-2
- SHA-3
- RIPEMD-160

Digital Signatures

Suppose a friend sends you a letter. How would you know that it really came from that person? One method is to have your friend add a signature to the bottom of the letter. If you recognize the signature, you can be more certain that it came from your friend.

Digital signatures are used in the same way but are a bit more complicated in how they are implemented. Digital signatures make use of asymmetric cryptography in which the signature is encrypted using the private key of an individual or organization. The public key is made well known through another means. The signature that has been encrypted with the private key can only be decrypted by the public key. Successful decryption verifies the data came from the correct source.

File Integrity Monitoring (FIM)

In some cases, it is important to determine if data within a file has changed. The process that handles this determination is called *file integrity monitoring*. With FIM a checksum is created when the file is in a known state called a *baseline*. This checksum is a value that is based on the current contents and, in some cases, additional file attributes, such as the file owner and permissions.

To determine if a file or a file attribute has been changed, you can take another checksum sometime in the future. When you're comparing the original checksum to the new checksum, if they match, the current file is the same as the original. This technique can be used to determine if someone has tampered with a key operating system file or a file that has been downloaded from a remote server.

Classification

Consider how you would treat data that contains credit card information compared to how you would treat data that contains comments that have been made regarding your company website. The data that contains credit card information is much more sensitive than the data that contains customer comments, so you would want to treat the data differently.

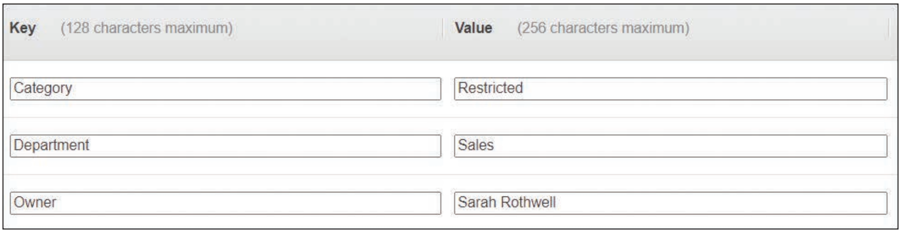
In this situation data classification becomes important. With data classification, you place data into different categories depending on how you want to treat the data. These categories can be based on rules related to how sensitive the data is, who should be able to read the data, who should be able to modify the data, and how long the data should be available. Unless you are storing data that is related to compliance regulations (like SOC 2, GDPR, PCI-DSS, or HIPAA), the data classification criteria are up to you. See the "Impact of Laws and Regulations" section in this chapter for more details on compliance regulations.

For example, you may consider classifying data based on who is permitted to access the data. In this case you may use the following commonly used categories:

- **Public:** This data is available to anyone, including those who are not a part of your organization. This typically includes information found on your public website, announcements made on social media sites, and data found in your company press releases.
- **Internal:** This data should be available only to members of your organization. An example of this data would be upcoming enhancements to a software product that your organization creates.
- **Confidential:** This data should be available only to select individuals who have the need to access this information. This could include personally identifiable information (PII), such as an employee Social Security number. Often the rules for handling this data are also governed by compliance regulations.
- **Restricted:** This data may seem similar to confidential data, but it is normally more related to proprietary information, company secrets, and in some cases, data that is regarded by the government as secret.

In the cloud there are different techniques to handle different types of data. These techniques could include placing different types of data into different storage locations. Chapter 12, "Storage in Cloud Environments," will discuss different storage solutions that are typically found in a cloud environment.

You can also make use of metadata. *Metadata* is data that is associated with the "real data," and it is used to describe or classify the "real data." In cloud environments, metadata is normally created by using a feature called *tags*. Tags are flexible in that you can create a key-value pair that describes components of the data. Figure 8.1 demonstrates applying tags to data in AWS.



Key (128 characters maximum)	**Value** (256 characters maximum)
Category	Restricted
Department	Sales
Owner	Sarah Rothwell

FIGURE 8.1 **AWS Tags**

Segmentation

In relation to data security, data *segmentation* is the process of placing data into different locations based on who should be able to access the data. For example, it would be a good practice to place employee PII in a different location (like a different database) from the data contained in press releases.

Data segmentation may also be a requirement for compliance regulations. For example, a regulation may require that specific data never leave a country. The reason is typically that laws govern the use of this data, and once the data leaves the country, those laws no longer have effect. In this case, data segmentation may be related to the region in which you store the data. See the "Impact of Laws and Regulations" section in this chapter for further details.

Access Control

Access control is the technique that determines who can access a resource. In terms of data access control, accessing the resource can include viewing, modifying, and destroying the data.

In most cloud environments, the definition of "who" can include both people and other resources. For example, you may have a payroll application that needs to access secure data about employees that is stored in a database. There must be access control rules in place that permit or block access for both people and resources.

People are given user accounts to access cloud resources. These user accounts are granted access to resources by using permissions.

Applications are assigned to roles, which are similar to user accounts in that permissions can be applied to roles just as they are applied to user accounts. However, applications can never be assigned to user accounts (in some cases a user may be assigned to a role, depending on the cloud environment that you are working in).

To learn more about how user accounts and roles impact access to resources, see Chapter 5, "Identity and Access Management."

Impact of Laws and Regulations

As previously mentioned, many laws and regulations govern how data is treated in an organization. They will vary depending on where your data is located. For example, the laws that govern data in the United States are different from the laws that govern data in the European Union (EU).

The laws and rules are numerous and vary based on the industry of your organization. For example, if your company is a retailer and you accept credit card payments, you will likely need to follow PCI Security Standards when dealing with credit card data. If your organization is a hospital, you will need to follow HIPAA regulations when dealing with patient data.

For the certification exam, it likely is not worthwhile to memorize a bunch of laws and regulations. Many organizations have full-time staff devoted to ensuring these laws are followed. Being aware of the impact of these laws is most critical for the exam.

Legal Hold

Organizations cannot just delete information whenever they want. Some information, such as employee records, must be maintained for specific periods of time in the event of investigations or litigation. The term *legal hold* is used by an organization's legal department to indicate how long specific data must be stored and how it should be made available in the event it is needed.

Records Management

Organizations often end up creating, gathering, and accumulating a lot of data. The volumes of information stored by an organization can result in high costs because storing data is not free. While cloud vendors provide many ways of storing data, they will charge to store data, so organizations typically do not want to keep data for longer than necessary.

Records management is the process of determining how and for how long to store data. This large topic includes data classification and encryption, as well as versioning, retention policies, and destruction policies.

Versioning

Versioning is the process of keeping track of file content changes over time. Many cloud technologies provide versioning as a feature that can be enabled, so the versioning happens automatically whenever a data record is changed.

Retention

Retention refers to a policy that determines how long data should be stored. A retention schedule is created that will determine when data is destroyed and how older data is stored until it is to be destroyed.

Destruction

The destruction of data must be clearly defined when developing a records management plan. When the data is to be destroyed is one key element to define, but also how the data is to be destroyed should be clearly stated in the plan. Data can be destroyed by physical destruction of records, degaussing, or zeroizing.

Write Once Read Many

Write once read many, also referred to as WORM, is a form of write protection in which the data can be written only once and then it cannot be modified. This is a critical feature when you need to ensure that data has not been tampered with after it was created.

Data Loss Prevention (DLP)

Data loss prevention is the process of ensuring that sensitive data is not misused, accessed, or lost. It is designed to prevent a data breach that may include accessing, modifying, or destroying data. In some cases, the DLP process must be clearly defined because the data is regulated by laws and regulations. In other cases, the DLP may be the result of wanting to keep classified information secure.

Some cloud providers will include DLP as a software tool. For example, Google Cloud has a product called Cloud DLP, which enables you to view how data is stored and processed, configure data inspection and monitoring, and reduce the risk of data loss. In other cases, the features of DLP may be associated with a specific data-based product. For example, there are techniques that you can use for DLP when storing data in AWS S3 buckets.

Cloud Access Security Broker (CASB)

CASB is a software tool that can be located either on-premises or in the cloud. It is designed to provide an interface between cloud resources (applications) and cloud users. It monitors access to cloud resources including data, issues warnings when a cloud resource may have been compromised, and enforces security policies.

CASBs also provide the means to perform audits, so access to data resources in the past can be analyzed. They are also often used for compliance reporting because they provide insights to data access over time.

CramQuiz

Answer these questions. The answers follow the last question. If you cannot answer these questions correctly, consider reading this section again until you can.

1. Which is not a form of data encryption?

❍ **A.** Data in use

❍ **B.** Data at rest

❍ **C.** Data in transit

❍ **D.** Data in the cloud

2. With this method you use a key (a unique value of some sort) to both encrypt and decrypt the data.

   ❍ **A.** Antisymmetric encryption

   ❍ **B.** Asymmetric encryption

   ❍ **C.** Symmetric encryption

   ❍ **D.** None of these answers are correct

3. Digital signatures make use of _____ cryptography in which the signature is encrypted using the private key of an individual or organization.

   ❍ **A.** Asymmetric

   ❍ **B.** Symmetric

   ❍ **C.** Antisymmetric

   ❍ **D.** Hashing

4. With ____ a checksum is created when the file is in a known state called a baseline.

   ❍ **A.** Digital signatures

   ❍ **B.** Hashing algorithms

   ❍ **C.** File integrity monitoring

   ❍ **D.** Data classification

5. The term _____ is used by an organization's legal department to indicate how long specific data must be stored and how it should be made available in the event it is needed.

   ❍ **A.** Records management

   ❍ **B.** Retention

   ❍ **C.** WORM

   ❍ **D.** Legal hold

CramQuiz Answers

1. Data in the cloud
2. Symmetric encryption
3. Asymmetric
4. File integrity monitoring
5. Legal hold

What Next?

If you want more practice on this chapter's exam objectives before you move on, remember that you can access all of the CramQuiz questions on the companion website. You can also create a custom exam by objectives with the practice exam software. Note any objectives you struggle with and go to that objective's material in this chapter.

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