

PROFESSIONAL EXAM GUIDE

# FlashArray™

# Architect

# Professional

Exam Number: FAAP\_004



PURE STORAGE CERTIFIED

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## About Pure Storage® Certified Exams

Achieving the Pure Storage Certified FlashArray™ Architect Professional certification demonstrates candidates' advanced expertise in integrating FlashArray into Pure Storage's product platform. This certification has been created to confirm candidates' deep understanding and specialized expertise in designing FlashArray solutions and articulating their value within varied IT environments, focusing exclusively on presales activities. Pure Storage's Certification exams have been developed following industry best practices to strive for reliable and valid test score interpretations.

### **This guide has three purposes:**

- to provide information to help you prepare for this Pure Storage exam
- to provide recommended references to prepare for the Pure Storage FlashArray Architect Professional Exam
- to help you determine if you are ready to sit for the exam.

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This guide outlines the knowledge, skills, and abilities required of a “minimally qualified candidate” for a specific job role, which will be evaluated in the exam.

## Section 1: Exam Registration Instructions

### 1.1. Exam Information

- Exam name: Pure Storage FlashArray™ Architect Professional
- Exam number: FAAP\_004
- Exam cost: \$129 (US Dollars)
- Number of questions: 60
- Question types: Multiple Choice (three to five options; one, two, or three correct answers)
- Time limit: 120 minutes

### 1.2. Creating an Online Account

1. Go to the [ExamStudio Storefront](#).
2. Select "Pure Storage FlashArray™ Architect Professional".
3. Either confirm the scheduling process or log in. The system will automatically recognize if you are eligible and will allow you to move forward.
4. Log in to your candidate dashboard and click "Schedule" under the Actions tab.
5. Select the appropriate time zone; then, select the date and time you want to take the exam. Please note that exams require a 24-hour lead time to schedule. The earliest date on which you can make a reservation is the next business day.
6. Complete a technical compatibility check by visiting <https://go.proctoru.com/testitout>

### 1.3. Online Exam Computer Requirements

Your computer must meet the minimum requirements of ProctorU, including:

- A stable broadband internet service with a download speed of at least 12Mbps down and 3Mbps up
- Chrome or Firefox web browser. Download ProctorU extensions: [Chrome](#) or [Firefox](#)
- Webcam
- Microphone

#### **ProctorU Requirements:**

Ensuring our exams are secure only increases the value of a Pure certification.

Info provided here will walk you through the steps to take just before your exam, including testing your equipment, what you need to have on hand for your exam, and what you can expect from the launch process. Your computer must meet the minimum requirements of ProctorU.

## 1.4. Day of the Exam

### Requirements:

- You must provide one form of government-issued photo ID (e.g., driver's license, passport).
- If you do not provide acceptable proof of identification via webcam to the proctor prior to the exam, you will not be allowed to take the exam. No refund or rescheduling is provided when an exam cannot be started due to failure to provide proper identification.
- You must also consent to have your photo taken. The ID will be used for identity verification only and will not be stored.
- You must be in a private, well-lit environment such as a conference room or home office.
- You must close all third-party programs and unplug any secondary monitors.
- The proctor will ask you to show your desk and surroundings before your exam can start.
- You cannot consult notes or books during the exam. The proctor will not allow the use of documents, materials, or websites during the exam.
- Make sure you have downloaded the ProctorU extension for either [Chrome](#) or [Firefox](#).

### Log in to Launch the Exam

To launch the exam, log in to your [ExamStudio account](#).

1. Enter your login credentials.
2. Click "Start Exam" under the Actions tab on your dashboard.

**NOTE:** The timer for your exam does not start until the proctor launches the exam. You will have 120 minutes to complete the exam. You may start your exam once the countdown timer reaches 0:00:00. If you do not start your exam within 15 minutes of this time frame, the system will automatically mark you as a No-Show and you will not be able to take your exam.

### Special Considerations

- To reset a forgotten password, visit <https://portal2.examstudio.com/ResetPassword.aspx?id=100106>. Once you reset your password, you can log in via your [candidate portal](#).
- For additional questions regarding ProctorU, please visit this [link](#).
- For any other additional questions or concerns, please contact the Pure Storage certification team at [certadmin@purestorage.com](mailto:certadmin@purestorage.com).

## 1.5. Exam Scoring

- One point is awarded for each correct answer to a single-response or multi-response question.
- No points are awarded for either incorrectly answered or unanswered single-response or multi-response questions.

## 1.6. After the Exam

Your candidate record will be updated with the results of your exam 24–48 hours following the exam. Please see Section 1.7 of this exam guide for instructions on how to review your candidate record.

**If You Pass:**

Your candidate record will have an eCertificate when you achieve a certification, as well as a Pure Storage certification logo for this exam. A certification is valid for 2 years, and, upon expiration, you will need to take the exam again.

**If You Fail:**

You will need to wait 72 hours to re-schedule the exam.

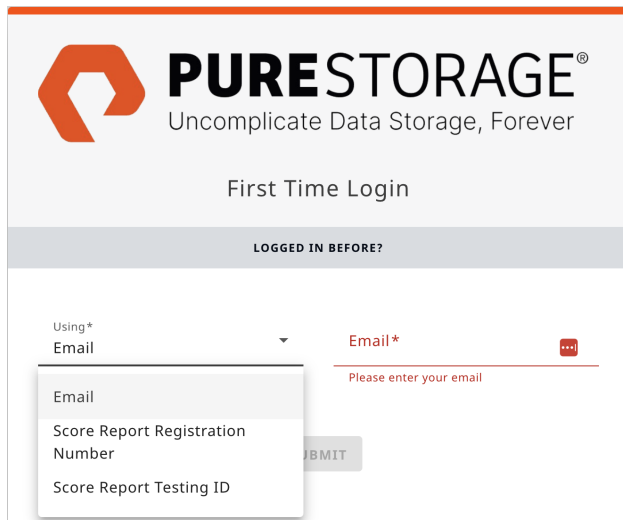
**1.7. Your Candidate Record**

To access your candidate record, visit <https://cp.certmetrics.com/purestorage/en/login>. From here, you will be able to access your score report(s).

The first time you log in, you will need to create an account.

**To create an account:**

1. Click "Never logged in before?" on the landing page.
2. Enter either your email address or data from your score report, as shown below.



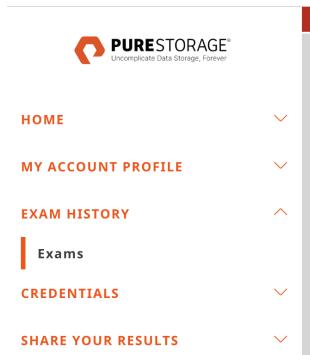
3. You will receive an email with instructions on how to access your account.

Once you create your account, you will be able to log in with your login ID and password.

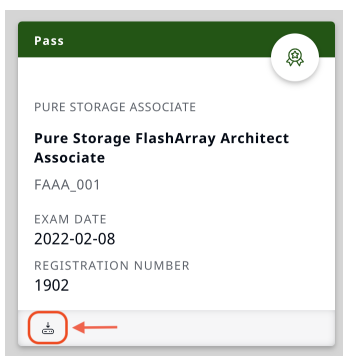
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### To retrieve your score report(s):

After you log in, click Exam History, then Exams.



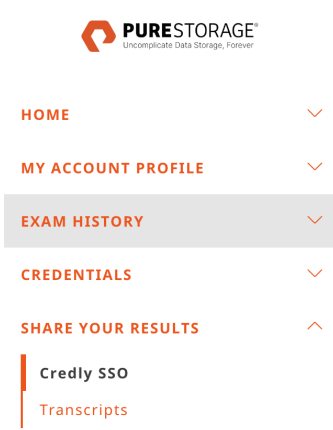
You will then see the exam card view for each of your exams. Click the icon in the lower left to download your score report.



### To share your results:

Click Share Your Results. From this menu, you can connect to Credly to download your digital badge and certificate.

You can also create a custom transcript that you can download or share.



## Section 2: Pure Storage FlashArray Architect Professional Exam Topics

### 2.1. Domain Names and Distribution

The job tasks measured on the exam are grouped into the following domains of practice and the questions on the exam are distributed as follows::

**NOTE:** Each question carries the same weight, and there is no partial credit for any question.

Domain	Percent of Exam
<b>Design and Plan</b>	36%
<b>Platform Architecture</b>	24%
<b>Advanced Storage Management &amp; Performance</b>	40%

### 2.2. Task Information

Within each domain, you will be asked about specific tasks you should be able to perform as a Pure Storage Certified FlashArray Architect Professional, including but not limited to:

#### Design and Plan

- Architect a FlashArray configuration to satisfy advanced customer requirements.
- Design a data protection solution based on customer requirements.
- Design a scalable and resilient storage architecture using Pure Storage FlashArray to meet specific business requirements

#### Platform Architecture

- Describe the life cycle of an I/O in a FlashArray system.
- Explain DirectFlash's unique advantages over competitive technologies.
- Explain how FlashArray architecture allows for Non-Disruptive Upgrades (NDUs).

#### Advanced Storage Management and Performance

- Perform advanced storage operations using the FlashArray GUI/CLI.
- Perform advanced storage operations with FlashArray File.
- Analyze performance and capacity metrics of an array.
- Configure and utilize Protection Groups and Pods.
- Explain how Pure products protect data against ransomware attacks.



## Section 3: The Pure Storage FlashArray Architect Professional Target Audience

This exam is designed for individuals who are currently performing or have previous work experience with the job responsibilities of a Systems Engineer who works extensively with the FlashArray, whether employed by Pure Storage or an affiliated partner.

### 3.1. The Minimally Qualified Candidate (MQC)

To pass the exam, you must possess at least the minimum level of knowledge, skills, and abilities required of a Systems Engineer at the Professional level. The MQC will have a deep understanding of the Pure Storage product portfolio and its unique advantages in the market. Additionally, they have advanced knowledge and practical experience in effectively positioning these products for appropriate use cases, demonstrating their ability to align Pure Storage solutions with specific customer needs and scenarios.

The Pure Storage FlashArray Architect Professional target candidate should be able to perform the following tasks without any assistance:

- Designing solutions based on client needs and current environment
- Describe the hardware and software architecture of FlashArray in detail, demonstrating a thorough understanding of its components and functionalities.
- Demonstrate in-depth knowledge of FlashArray data reduction.
- Understand FlashArray's controller design, focused on data management and system connectivity.
- Demonstrate an in-depth knowledge of DirectFlash technology.
- Perform advanced management tasks using the FlashArray GUI/CLI and Pure1, showcasing proficiency in navigating and utilizing these interfaces.
- Define and deploy data protection and data workflow strategies with snapshot, replication, and SafeMode.
- Explain the use cases of the different replication technologies and where they fit into a customer's DR plan.
- Demonstrate an understanding of host operating systems utilizing best practices (i.e., MPIO, NMP, Connectivity).
- Understand the security features embedded in the FlashArray architecture, including data-at-rest encryption, key management, and secure access controls.
- Understand the availability features within the FlashArray.
- Understand how Fusion brings cloud and DevOps benefits to customers' storage environments.
- Explain how FA File services support file storage requirements, configuring file shares and applying NFS and SMB protocols.

### 3.2. MQC Work Experience

A minimally qualified Pure Storage FlashArray Architect Professional candidate typically has the following work experience:

- Intermediate-level role
- Minimum of 3-5 years of storage industry experience
- Minimum of 1-2 years of Pure Storage experience

## Section 4: Determine Exam Readiness

Nothing guarantees that you will pass your test; however, the more practical work experience you have, the better your chances of passing the test. Use the self-assessment preparation worksheet to evaluate your level of readiness.

### 4.1. Exam Prerequisites

There are no prerequisites for the Pure Storage FlashArray Architect Professional Examination, however, successful completion of the FlashArray Architect Associate exam is recommended.

### 4.2. On-the-Job Experience

Since Pure Storage exams measure knowledge, skills, and abilities for a specific job role, one of the best ways to prepare for the exam is to make sure you have the minimum work experience, as described in this guide.

### 4.3. Self-Assessment Preparation Worksheet

Use the following worksheet to review the exam topics and assess your own readiness. If you need additional preparation on a certain topic, there are additional links to information in the prior "Task Information" section as well as a "Recommended Learning" section, where you will find recommendations and links to those learning opportunities.

I can:

Topic	Yes	No
<b>Design and Plan</b>		
Analyze provided data utilizing an estimated data reduction rate, growth projections, capacity needs, and data protection demands.		
Demonstrate an understanding of the differences between raw, usable, and effective capacities and how they impact the customer.		
Demonstrate an understanding of the benefits AND Limitations of the following technologies: ActiveCluster, ActiveDR, Snapshot Replication and CloudSnap.		
Based on scenario, determine appropriate data protection methods.		
Discuss RAID-HA's approach to wear leveling and how it extends the lifespan of flash storage.		
Given a complex scenario, determine the optimal FlashArray family and model.		
Manage FlashArray's modular expansion and elastic performance scaling capabilities based on customer requirements.		
Optimize FlashArray integration with virtualization platforms and cloud services.		

### Platform Architecture

Identify the path of an I/O from host to SAN, through storage network, and through a FlashArray (e.g.; garbage collection, NVRAM, pathing).

Identify the order and mechanisms used for data reduction in the I/O lifecycle (e.g.; deep data reduction, deduplication, pattern removal, compression).

Identify the benefits the I/O path in a FlashArray provides for data protection.

Contrast the benefits of FlashArray DirectFlash Modules as compared to SSDs.

Summarize the innovation cycle of DirectFlash, focusing on continuous improvements through software upgrades and Evergreen capabilities.

Explain the topology and protocols used to deploy DirectFlash.

Describe the features in the FlashArray architecture that allow for a controller to be replaced without performance loss, or loss of access to data.

Explain the configuration requirements for a host OS (e.g. Windows or Linux) needed to allow the FlashArray to be upgraded without any disruption.

Apply possible upgrade paths that can be performed between FlashArray models/generations.

### Advanced Storage Management and Performance

Demonstrate an understanding of the networking requirements for File Services on FlashArray (e.g.: LACP, file vif, trunking)

Explain processes for recovering deleted objects from the eradication pending queue.

Explain File functionality on a FlashArray.

Explain snapshot usage & data recovery with File.

Analyze the SAN, Array and total latency from given tool outputs in the GUI and CLI.

Analyze performance metrics to determine reasons for latency changes

Outline an ActiveCluster Stretched Pod configuration

Explain Asynchronous Replication partnership configuration requirements

Restore or copy data from a Protection Group snapshot

Demonstrate an understanding of the differences between Array-Wide and Default Safemode

Explain the role of Protection Groups in Safemode

Demonstrate an understanding of advanced features such as QoS, vSphere plugin, SSO, Directory services

Project future capacity needs given current and historic capacity metrics

## Section 5: Pure Storage FlashArray Architect Professional Exam Sample Questions

Review and practice taking exam questions to get a sense for the types of questions on the exam. Please note that **your performance here does not indicate how you will do on the actual exam**. To fully prepare for the exam, closely review the topic areas and objectives in this Exam Guide.

The correct answers are at the end of the exam guide.

1. A customer environment consists of 60TB of Oracle Databases, 100TB of Virtual Server data, and 70TB of Virtual Desktop data. Assume data reduction ratios of 3:1 for Databases, 5:1 for Virtual Servers, and 7:1 for Virtual Desktops. There is NO compression or encryption at the application level.

What is the minimum usable capacity that should be sized on a FlashArray to host this customer environment?

- a. 230TB
  - b. 80TB
  - c. 50TB
  - d. 30TB
2. What are the advantages of using NVMe over SAS/SATA?
- a. NVMe uses a new SCSI command set and has more available queues vs. SAS/SATA.
  - b. NVMe uses a reduced and more efficient command set and has more available queues vs. SAS/SATA.
  - c. NVMe uses a reduced and more efficient command set and has the same number of queues vs. SAS/SATA.
  - d. NVMe uses a new SCSI command set and has the same number of queues vs. SAS/SATA.
3. When designing a FlashArray configuration with Role-Based Access Control (RBAC), which three roles are available on the FlashArray?
- a. Operator, Storage Admin, Superuser
  - b. Read Only, Storage Admin, Array Admin
  - c. Operator, Storage Admin, Array Admin
  - d. Read Only, Storage Admin, Network Admin
4. A customer fills a 100GB FlashArray volume with 80GB of data. A customer tries to resize the volume to 1TB but accidentally leaves the units as GB. The volume is effectively truncated to 1GB.

How should an SE resolve this issue?

- a. Resize the volume back to the original size using the CLI
- b. Unmount the volume and use host-side tools to recover the filesystem from the volume's deleted sectors
- c. Call Pure Storage Support to have the data restored from the RAID parity
- d. Recover the volume from the auto-generated snapshot in the Destroyed Snapshots list

5. Which Purity//FA feature supports Microsoft bulk data movement?

- a. XCOPY
- b. VSS
- c. ODX
- d. VAAI

6. The FlashArray GUI reports Volume Space as 80GB for a volume named WinVol. The customer takes a snapshot of this volume and copies the snapshot to a new volume called WinVol\_Clone.

With NO further changes to the dataset, how is the space reported for these two volumes in the GUI?

- a. Volumes = 80GB, Snapshots = 0GB
- b. Volumes = 0GB, Shared = 80GB
- c. Shared = 80GB, Snapshots = 80GB
- d. Volumes = 160GB, Snapshots = 0GB

7. A user is a member of multiple FlashArray groups.

What are the effective permissions for that user?

- a. The user will inherit the permissions of the most powerful group.
- b. The user will inherit the permissions of all group memberships.
- c. The user will inherit the "no access" permission.
- d. The user will inherit the permissions of the most restrictive group.

## Section 6: Answer Key

Correct answers are shown below in ***bold italics***.

1. A customer environment consists of 60TB of Oracle Databases, 100TB of Virtual Server data, and 70TB of Virtual Desktop data. Assume data reduction ratios of 3:1 for Databases, 5:1 for Virtual Servers, and 7:1 for Virtual Desktops. There is NO compression or encryption at the application level.  
What is the minimum usable capacity that should be sized on a FlashArray to host this customer environment?
  - a. 230TB
  - b. 80TB
  - c. ***50TB***
  - d. 30TB
  
2. What are the advantages of using NVMe over SAS/SATA?
  - a. NVMe uses a new SCSI command set and has more available queues vs. SAS/SATA.
  - b. ***NVMe uses a reduced and more efficient command set and has more available queues vs. SAS/SATA.***
  - c. NVMe uses a reduced and more efficient command set and has the same number of queues vs. SAS/SATA.
  - d. NVMe uses a new SCSI command set and has the same number of queues vs. SAS/SATA.
  
3. When designing a FlashArray configuration with Role-Based Access Control (RBAC), which three roles are available on the FlashArray?
  - a. Operator, Storage Admin, Superuser
  - b. ***Read Only, Storage Admin, Array Admin***
  - c. Operator, Storage Admin, Array Admin
  - d. Read Only, Storage Admin, Network Admin
  
4. A customer fills a 100GB FlashArray volume with 80GB of data. A customer tries to resize the volume to 1TB but accidentally leaves the units as GB. The volume is effectively truncated to 1GB.  
How should an SE resolve this issue?
  - a. Resize the volume back to the original size using the CLI
  - b. Unmount the volume and use host-side tools to recover the filesystem from the volume's deleted sectors
  - c. Call Pure Storage Support to have the data restored from the RAID parity
  - d. ***Recover the volume from the auto-generated snapshot in the Destroyed Snapshots list***



5. Which Purity//FA feature supports Microsoft bulk data movement?
- XCOPY
  - VSS
  - ODX**
  - VAAI
6. The FlashArray GUI reports Volume Space as 80GB for a volume named WinVol. The customer takes a snapshot of this volume and copies the snapshot to a new volume called WinVol\_Clone.  
With NO further changes to the dataset, how is the space reported for these two volumes in the GUI?
- Volumes = 80GB, Snapshots = 0GB
  - Volumes = 0GB, Shared = 80GB
  - Shared = 80GB, Snapshots = 80GB
  - Volumes = 160GB, Snapshots = 0GB**
7. A user is a member of multiple FlashArray groups.  
What are the effective permissions for that user?
- The user will inherit the permissions of the most powerful group.
  - The user will inherit the permissions of all group memberships.
  - The user will inherit the "no access" permission.
  - The user will inherit the permissions of the most restrictive group.**



## Support

For information on Pure Storage's certification programs, visit [this link](#). To contact us, please send an email to [certadmin@purestorage.com](mailto:certadmin@purestorage.com).

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