

# Data Security Analysis in Online Payment Processing



*Simpson Innocent Nana*  
*6th June, 2024*



# Section One: Data Governance

---



# Strategic Data Security Policies

## **IT Staff should perform a data classification annually, or when there are notable business or technology changes.**

Performing a data classification annually, or when significant business or technology changes occur, ensures that JFin Payments can consistently identify and protect sensitive information. This practice helps in maintaining the confidentiality, integrity, and availability of data by categorizing it according to sensitivity and applying appropriate security controls. Regular updates accommodate new types of data and evolving threats, enhancing compliance with regulations such as GDPR and PCI DSS, and supporting effective risk management by prioritizing resources towards the most critical data assets, thus improving operational efficiency.

## **IT Staff should perform an application and critical system classification annually, or when there are notable business or technology changes.**

Conducting an annual classification of applications and critical systems ensures that JFin Payments remains vigilant about which systems are essential to business operations and data security. By regularly assessing and updating the classification, the IT staff can prioritize security measures for the most critical systems, thereby reducing the risk of breaches and downtime. This approach enhances compliance with industry standards, supports robust risk management strategies, and ensures that security efforts are aligned with the organization's evolving technological landscape and business needs, thereby maintaining operational resilience and efficiency.

## **IT Staff should perform a regulatory assessment annually, or when there are notable business or technology changes.**

Performing a regulatory assessment annually, or during notable business or technology changes, keeps JFin Payments in compliance with current laws and regulations such as GDPR, CCPA, and PCI DSS. This proactive approach helps identify and address regulatory gaps, thereby avoiding legal penalties and fostering customer trust. Regular assessments ensure that the company's data security policies are up-to-date with the latest regulatory requirements, contributing to robust risk management. Additionally, it supports operational efficiency by preventing costly compliance failures and ensuring that business processes adhere to the highest standards of data protection.



# Data Classification

**Confidential:** Data whose loss would have a catastrophic impact on the business.

**Internal:** Data whose loss would have a significant but not catastrophic impact on the business.

**Public:** Data whose loss would have minimal impact on the business if exposed.

Categorize each dataset into one of the three data types

Dataset	Data Type
Employee profile data	Confidential
Customer profile data	Confidential
Company email	Internal
Repository of previously published blogs	Public
Internal employee newsletters	Internal
Technology engineering diagrams	Confidential
Intellectual property	Confidential



# Data Regulations

<b>Confidential</b>	<p>General Data Protection Regulation (GDPR): GDPR applies to the processing of personal data of individuals within the European Union. Confidential data like social security numbers or credit card numbers are considered personal data under GDPR. The regulation mandates strict handling, storage, and processing requirements to protect such sensitive information from breaches.</p> <p>Health Insurance Portability and Accountability Act (HIPAA): For organizations dealing with healthcare data, HIPAA sets standards for protecting sensitive patient information. Data such as medical records or health insurance details are classified as confidential and are subject to HIPAA's stringent privacy and security rules to prevent unauthorized access and ensure data integrity.</p> <p>Payment Card Industry Data Security Standard (PCI DSS): PCI DSS applies to organizations that handle credit card information. This regulation enforces security measures to protect cardholder data and prevent fraud. Confidential data like credit card numbers must be secured according to PCI DSS requirements to avoid severe financial and reputational damage.</p>



# Data Regulations

Continuation:

<b>Internal</b>	Sarbanes-Oxley Act (SOX): SOX applies to publicly traded companies and mandates rigorous internal controls and procedures for financial reporting. Internal data such as financial statements, internal audit reports, and other non-public financial information must be managed securely to ensure accuracy and reliability, thus preventing fraud and maintaining investor trust.
<b>Public</b>	Freedom of Information Act (FOIA): FOIA applies to federal agencies and ensures public access to government records. Public data, such as published financial reports or official statements, must be accessible to the public under FOIA. This regulation promotes transparency and accountability in government operations.



# Regulatory Compliance

**Encryption Policy:** All sensitive data transmitted over internal and external networks must be encrypted using industry-standard encryption algorithms. Encryption keys must be securely managed and periodically rotated to mitigate the risk of unauthorized access and data interception.

**Access Control Policy:** Access to sensitive data repositories, systems, and applications must be restricted based on the principle of least privilege. Access permissions must be granted only to authorized personnel and reviewed regularly to ensure compliance with regulatory requirements.

**Data Retention Policy:** A comprehensive data retention schedule must be established to govern the storage and disposal of sensitive data. Data deemed no longer necessary for business or regulatory purposes must be securely erased or destroyed in accordance with applicable data retention regulations.

**Incident Response Policy:** A documented incident response plan must be in place to address data breaches or security incidents promptly. The plan should outline procedures for detecting, reporting, and responding to security breaches, including notification of affected parties and regulatory authorities as required by law.

**Employee Training and Awareness Policy:** Regular training sessions and awareness programs must be conducted to educate employees about data security best practices, regulatory compliance requirements, and their roles and responsibilities in safeguarding sensitive information.

**Vendor Management Policy:** Vendors and third-party service providers handling sensitive data on behalf of JFin Payments must adhere to strict security standards and contractual obligations. Regular audits and assessments should be conducted to ensure compliance with data protection regulations and mitigate third-party risks.



# Section Two: Data Confidentiality

---





# Securing Disks

*Place the screenshot from the Keys page of the Key Vault you created, with the generated key.*

The screenshot shows the Microsoft Azure portal interface for a Key Vault named 'MyTestVault04112'. The 'Keys' page is active, displaying a table with the following data:

Name	Status	Expiration date
DiskEncryptionKey	✓ Enabled	

A notification at the top of the page states: "The key 'DiskEncryptionKey' has been successfully created." The left sidebar shows the navigation menu with options: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Access policies, Events, Objects, Keys, Secrets, Certificates, Settings, Monitoring, Automation, and Help. The 'Keys' option is currently selected.



# Securing Disks

*Place the screenshot from Key page of the Disk Encryption Set you created*

The screenshot displays the Microsoft Azure portal interface. The top navigation bar shows the user is logged in as 'odl\_user\_260241@udaci...' under the 'UDACITY (UDACITYLABS.ONMIC...' subscription. The main header indicates the current page is 'DiskEncryptionSet - Microsoft Azure - [InPrivate]'. The breadcrumb trail shows the path: 'Home > Microsoft.DiskEncryptionSet-20240605233139 | Overview > DiskEncryptionSet'. The left-hand navigation pane lists various options: Overview, Activity log, Access control (IAM), Tags, Settings, Resources, Key (selected), Properties, Locks, Automation, and Help. The 'Key' page content includes a search bar, 'Save', 'Discard', and 'Give feedback' buttons. A message states: 'Select a key vault and a key in the same subscription and region as the disk encryption set to replace the current key in your encryption set. [Learn more](#)'. The 'Current key' field contains the URL 'https://MyTestVault04112.vault.azure.net/keys/DiskEncryptionKey/78562bbc...'. Below this are three sections: 'Change key' (with a link), 'Auto key rotation' (with a toggle switch), 'User-assigned identity' (with a 'Select an identity' link), and 'Multi-tenant application' (with a 'Select an application' link). A blue information icon with a message states: 'You are required to select the user-assigned managed identity first.'



# Securing Disks

*Place the screenshot from the Encryption page of the Disk you created*

The screenshot shows the Microsoft Azure portal interface. The browser address bar displays the URL: `https://portal.azure.com/#@udacitylabs.onmicrosoft.com/resource/subscriptions/4b3772c6-b172-4365-af69-d7c8dd719197/resou...`. The page title is "LabVM-260241-osdisk | Encryption". The left-hand navigation pane includes sections like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings, and a list of disk-related options: Encryption (selected), Networking, Disk Export, Properties, Locks, Monitoring, and Automation. The main content area features a "Key management" dropdown menu set to "Customer-managed key: DiskEncryptionSet". Above this menu, a text block states: "Azure offers server-side encryption with platform-managed keys by default for managed disks. You may optionally choose to use a customer-managed key. [Learn more](#)". At the top of the main area, there are action buttons: Save, Discard, Refresh, and Give feedback.



# Section Three: Data Integrity

---



# File Integrity Verification

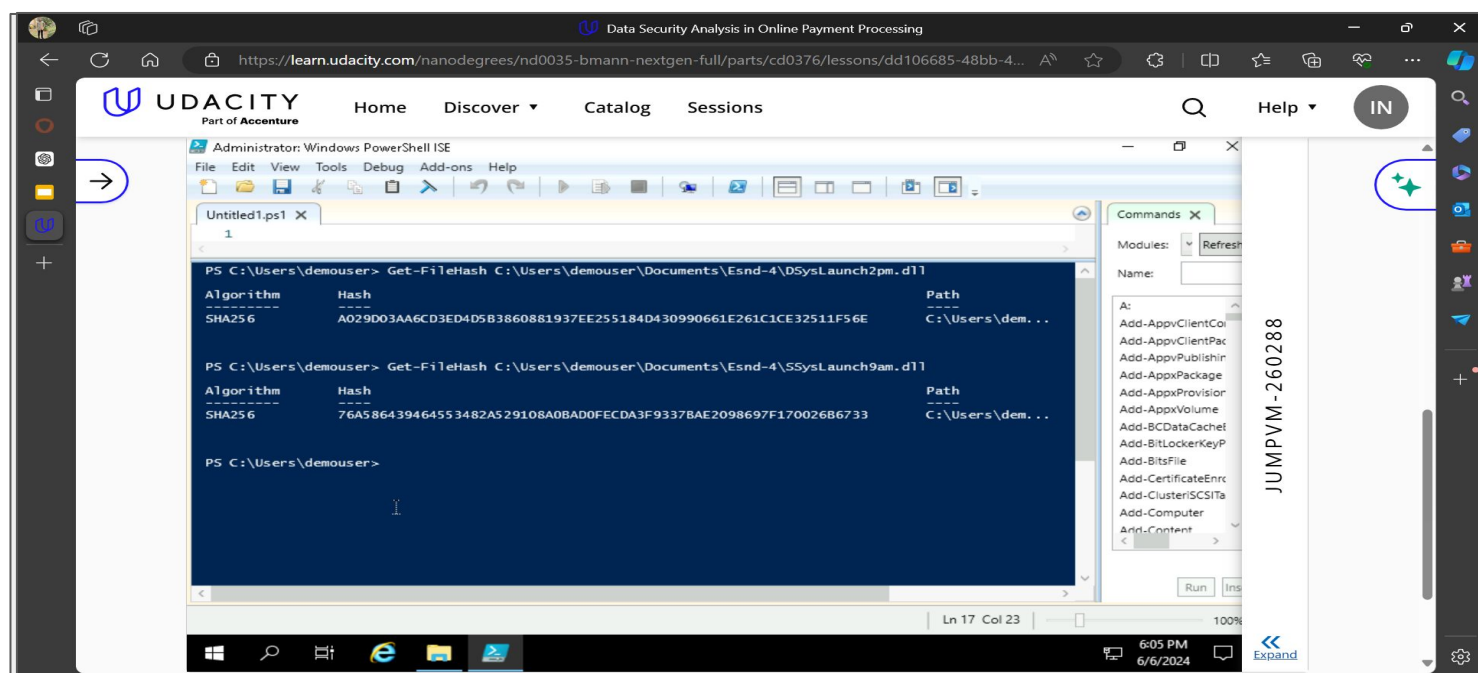
The original DSysLaunch2pm.dll hash:

B029D03AA6CD3ED4D5B3860881937EE255184D430990661E261C1CE3251184D4

The original SSysLaunch9am.dll hash:

76A586439464553482A529108A0BAD0FECDA3F9337BAE2098697F170026B6733

- The hashes do not match, indicating that the file DSysLaunch2pm.dll has been modified. This discrepancy suggests that the file's integrity has been compromised, meaning it might have been altered or corrupted.
- The hashes match, indicating that the file SSysLaunch9am.dll remains unchanged. This consistency suggests that the file's integrity has been maintained, and it has not been altered or corrupted.



```
PS C:\Users\demouser> Get-FileHash C:\Users\demouser\Documents\Esnd-4\DSysLaunch2pm.dll

Algorithm Hash Path
-----
SHA256 A029D03AA6CD3ED4D5B3860881937EE255184D430990661E261C1CE32511F56E C:\Users\dem...

PS C:\Users\demouser> Get-FileHash C:\Users\demouser\Documents\Esnd-4\SSysLaunch9am.dll

Algorithm Hash Path
-----
SHA256 76A586439464553482A529108A0BAD0FECDA3F9337BAE2098697F170026B6733 C:\Users\dem...

PS C:\Users\demouser>
```



# Auditing Security Settings

Place the screenshot of the password policy screen here

The screenshot shows a web browser window displaying a Udacity course page titled "Data Security Analysis in Online Payment Processing". The browser address bar shows the URL: <https://learn.udacity.com/nanodegrees/nd0035-bmann-nextgen-full/parts/cd0376/lessons/dd106685-48bb-4...>. The Udacity website header is visible, including the logo, navigation links (Home, Discover, Catalog, Sessions), a search bar, and a user profile icon labeled "IN".

Overlaid on the website is a Windows "Local Security Policy" window. The left pane shows the "Security Settings" tree with "Account Policies" expanded, and "Password Policy" selected. The right pane displays the following security settings:

Policy	Security Setting
Enforce password history	0 passwords remembered
Maximum password age	42 days
Minimum password age	0 days
Minimum password length	0 characters
Minimum password length audit	Not Defined
Password must meet complexity requirements	Enabled
Store passwords using reversible encryption	Disabled

At the bottom of the screenshot, a Windows taskbar is visible with the system clock showing 6:09 PM on 6/6/2024. A vertical text label "JUMPVM-260288" is positioned on the right side of the image.



# Auditing Security Settings

*Place the screenshot of account lockout policy screen here*

The screenshot shows a Windows 10 desktop with a web browser and a Local Security Policy window open. The browser displays the Udacity website. The Local Security Policy window is titled 'Local Security Policy' and shows the 'Account Lockout Policy' selected in the left-hand tree. The right-hand pane displays the following settings:

Policy	Security Setting
Account lockout duration	Not Applicable
Account lockout threshold	0 invalid logon attempts
Reset account lockout counter after	Not Applicable

The taskbar at the bottom shows the time as 6:10 PM on 6/6/2024. A vertical text label 'JUMPVM-260288' is visible on the right side of the screenshot.



# Auditing Security Settings

Place the screenshot of the audit policy screen here

UDACITY  
Part of Accenture

Home Discover Catalog Sessions

Search Help IN

Local Security Policy

File Action View Help

Security Settings

- Account Policies
  - Password Policy
  - Account Lockout Policy
- Local Policies
  - Audit Policy**
  - User Rights Assignment
  - Security Options
  - Windows Defender Firewall with Advanced Security
  - Network List Manager Policies
  - Public Key Policies
  - Software Restriction Policies
  - Application Control Policies
  - IP Security Policies on Local Computer
  - Advanced Audit Policy Configuration

Policy	Security Setting
Audit account logon events	No auditing
Audit account management	No auditing
Audit directory service access	No auditing
Audit logon events	No auditing
Audit object access	No auditing
Audit policy change	No auditing
Audit privilege use	No auditing
Audit process tracking	No auditing
Audit system events	No auditing

JUMPVM-260288

6:11 PM  
6/6/2024

Expand





# Auditing Security Settings

Place the screenshot of the security options screen here

UDACITY  
Part of Accenture

Home Discover Catalog Sessions

https://learn.udacity.com/nanodegrees/nd0035-bmann-nextgen-full/parts/cd0376/lessons/dd106685-48bb-4...

Local Security Policy

File Action View Help

Security Settings

- Account Policies
- Password Policy
- Account Lockout Policy
- Local Policies
  - Audit Policy
  - User Rights Assignment
  - Security Options
- Windows Defender Firewall with Advanced Security
- Network List Manager Policies
- Public Key Policies
- Software Restriction Policies
- Application Control Policies
- IP Security Policies on Local Computer
- Advanced Audit Policy Configuration

Policy	Security Setting
Accounts: Administrator account status	Enabled
Accounts: Block Microsoft accounts	Not Defined
Accounts: Guest account status	Disabled
Accounts: Limit local account use of blank passwords to console logon only	Enabled
Accounts: Rename administrator account	demouser
Accounts: Rename guest account	Guest
Audit: Audit the access of global system objects	Disabled
Audit: Audit the use of Backup and Restore privilege	Disabled
Audit: Force audit policy subcategory settings (Windows Vista and Windows 7)	Not Defined
Audit: Shut down system immediately if unable to log security events	Disabled
DCOM: Machine Access Restrictions in Security Descriptor	Not Defined
DCOM: Machine Launch Restrictions in Security Descriptor	Not Defined
Devices: Allow undock without having to log on	Enabled
Devices: Allowed to format and eject removable media	Not Defined
Devices: Prevent users from installing printer drivers	Enabled
Devices: Restrict CD-ROM access to locally logged-on user only	Not Defined
Devices: Restrict floppy access to locally logged-on user only	Not Defined
Domain controller: Allow server operators to schedule tasks	Not Defined
Domain controller: Allow vulnerable Netlogon secure channel authentication	Not Defined
Domain controller: LDAP server channel binding token requirements	Not Defined
Domain controller: LDAP server signing requirements	Not Defined
Domain controller: Refuse machine account password change	Not Defined

JUMPV - 260288

6:12 PM  
6/6/2024

Expand



# Enhancing VM Security

## 1. Implement Strong Password Policies

Implementing a robust password policy ensures that passwords are complex, lengthy, and unique, significantly reducing the likelihood of brute force attacks and unauthorized access. By enforcing password history, users cannot reuse their old passwords, increasing overall security. Shortening the maximum password age ensures passwords are updated regularly, and setting a minimum password age prevents frequent, superficial changes. A minimum length of 12 characters and complexity requirements make passwords harder to crack.

## 2. Enable Account Lockout Policy

Enabling an account lockout policy helps prevent unauthorized access through repeated login attempts (brute force attacks). By locking accounts after multiple failed attempts, the system deters attackers from guessing passwords. Setting a reasonable lockout duration and counter reset time ensures legitimate users can regain access while providing a deterrent to potential attackers.

## 3. Enable Comprehensive Audit Policies

Enabling comprehensive auditing helps monitor and record critical actions and events within the system. This allows for the detection of unauthorized access attempts, changes in user accounts, policy modifications, and system events. Logging both successes and failures provides a complete picture of activity, helping in forensic analysis and compliance with regulatory requirements. It also aids in identifying and responding to potential security incidents in a timely manner.



# Enhancing VM Security

Continuation:

## 4. Secure Administrative and Guest Accounts

Renaming the default administrator and guest accounts makes it harder for attackers to target these accounts using common names. Disabling the guest account eliminates a potential entry point that could be exploited. Ensuring the administrator account is enabled and secured with a strong password and monitoring further protects against unauthorized access. These measures add layers of obscurity and control, enhancing overall system security.



# Section Four: Data Availability

---



# Developing a Data Backup Strategy

Confidential Data	
Backup Frequency:	Daily
Retention Period:	7 years
<p>Confidential data includes sensitive information such as customer payment details, personally identifiable information (PII), and financial records. Given the criticality of this data, daily backups are essential to ensure minimal data loss in case of a system failure or cyber-attack. Regulatory requirements such as GDPR, PCI-DSS, and other financial regulations often mandate stringent data protection and retention policies. Retaining backups for 7 years aligns with legal obligations and industry best practices, ensuring data availability for audits, compliance checks, and potential disputes.</p>	
Internal Data	
Backup Frequency:	Weekly
Retention Period:	1 year
<p>Internal data includes operational information, employee records, and internal communications, which are important but less critical than confidential data. Weekly backups are sufficient to protect against data loss without overburdening the system. This frequency balances the need for data protection with resource optimization. A retention period of 1 year ensures that internal data is available for operational continuity, internal audits, and regulatory compliance, as some industry standards require maintaining business records for at least a year.</p>	



# Developing a Data Backup Strategy

Public Data	
Backup Frequency:	Monthly
Retention Period:	90 Days
<p>Public data includes information available on the company's website, marketing materials, and other non-sensitive data. Since this data is not critical and is often easily reproducible, monthly backups are adequate. This frequency minimizes the risk of data loss while keeping the process efficient and cost-effective. A retention period of 90 days is sufficient for public data, providing a reasonable timeframe to recover from accidental deletions or updates without occupying excessive storage space.</p>	



# Creating a Backup

Place the screenshot of the LabVM Backup screen here

The screenshot shows the Microsoft Azure portal interface for the LabVM-260288 Backup page. The page is titled "LabVM-260288 | Backup" and is categorized as a "Virtual machine". The left sidebar contains a navigation menu with options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Connect, Networking, Settings, Availability + scale, Security, Backup + disaster recovery, Backup, Disaster recovery, Restore point, and Operations. The main content area displays the backup status and configuration details.

**Backup now** **Restore VM** **File Recovery** **Stop backup** **Resume backup** **Delete backup data**

Try our new Business Continuity Center for the at scale BCDR management of your resources protected across Azure Backup and Site Recovery. →

**Essentials** [JSON View](#)

Recovery services vault <a href="#">vault811</a>	Backup Pre-Check ✓ Passed
Subscription ( <a href="#">move</a> ) <a href="#">Udacity CloudLabs Sub - 48</a>	Last backup status ⚠ Warning (Initial backup pending)
Subscription ID 3011ed27-260d-4215-af4c-ec9434399817	Backup policy <a href="#">DailyPolicy-lx3vg06z (Standard)</a>
Alerts (in last 24 hours) <a href="#">View alerts</a>	Oldest restore point -
Jobs (in last 24 hours) <a href="#">View jobs</a>	Included disk(s) <a href="#">All disks</a>

**Recovery points**

This list is filtered for last 30 days of recovery points. To recover from recovery point older than 30 days, as well as vault-archive, [click here](#).

Long term recovery points can be moved to vault-archive. To move all 'recommended recovery points' to vault-archive tier, [click here](#).

**CRASH CONSISTENT** **APPLICATION CONSISTENT** **FILE-SYSTEM CONSISTENT**

0 0 0