# Oracle® Hospitality Cruise Shipboard Property Management System

PA-DSS 3.2 Implementation Guide
Release 8.0.x
**E85715-04**

September 2020

ORACLE

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# Preface

This document describes the steps needed for your Oracle Hospitality Cruise Shipboard Property Management System (SPMS) installations to comply with Payment Application – Data Security Standards (PA-DSS). The information in this document is based on PCI Security Standards Council Payment Application - Data Security Standards program (version 3.2 dated June 2016). For reference, download the PCI PA-DSS 3.2 Requirements and Security Assessment Procedures from the PCI SSC Document Library.

The Oracle Hospitality Cruise Shipboard Property Management System instructs and advises its customers to deploy the application in a manner that adheres to the PCI Data Security Standards. (v3.2). Subsequent to this, follow the best practices and hardening methods, such as those referenced by the Center for Internet Security (CIS) and their various benchmarks, in order to enhance system logging, reduce the chance of intrusion, increase the ability to detect intrusion, and other general recommendations to secure networking environments. Such methods include, but are not limited to, enabling operating system auditing subsystems, system logging of individual servers to a centralized logging server, disabling infrequently used or frequently vulnerable networking protocols, and implementing certificate-based protocols for access to servers by users and vendors.

Follow the steps outlined in this Implementation Guide for Oracle Hospitality Cruise Shipboard Property Management System installation to support your PCI DSS compliance efforts.

## Revision History

| Date | Description of Change |
|---|---|
| December 2015 | • Initial publication for PA-DSS 2.1 |
| September 2016 | • Updated for PA-DSS 3.2 |
| March 2017 | • Minor update |
| July 2017 | • Grammatical and formatting updates |
| Jun 2018 | • Removal of Oracle 11g |
| June 2020 | • Low Impact Changes for the validation under 8.0.x |
| September 2020 | • Updated with Payment Application – Data Security Standard (PA-DSS) PCI SSC PA-DSS 3.2 requirements. |

This PA-DSS Implementation Guide is reviewed and updated on a yearly basis, when there are changes to the underlying application, or when there are changes to PA-DSS requirements. Go to the Hospitality documentation page at the Oracle Help Center at http://docs.oracle.com/en/industries/hospitality/ to view or download the current version of this guide, and refer to the Shipboard Property Management System Release Notes and this guide's Revision History to learn what has been updated or changed. In order to ensure your PCI DSS is compliance, subscribe to receive Oracle Security Alerts email by clicking the Critical Patch Updates link on the Oracle Technology Network at http://www.oracle.com/technetwork/index.html. This provides timely information on any possible updates to the PA-DSS Implementation Guide that you need to know about in order to continue to using SPMS in a PCI DSS compliant manner.

# 1 Executive Summary

Oracle Hospitality Cruise SPMS 8.0.x has been Payment Application - Data Security Standard (PA-DSS) validated, in accordance with PA-DSS Version 3.2. For the PA-DSS assessment, we worked with the following PCI SSC approved Payment Application Qualified Security Assessor (PAQSA):

| | |
|---|---|
| Coalfire Systems, Inc.<br>11000 Westmoor Circle, Suite 450,<br>Westminster, CO 80021 | Coalfire Systems, Inc.<br>1633 Westlake Ave N #100<br>Seattle, WA 98109 |

This document also explains the Payment Card Industry (PCI) initiative and the Payment Application Data Security Standard (PA-DSS) guidelines. The document also provides specific installation, configuration, and ongoing management best practices for using Oracle Hospitality Cruise SPMS system only, Oracle Hospitality Cruise Shipboard Property Management System Version 8.0.x as a PA-DSS validated application operating in a PCI DSS compliant environment.

## PCI Security Standards Council Reference Documents

The following documents provide additional details surrounding the PCI SSC and related security programs:

- Payment Card Industry Payment Applications - Data Security Standard (PCI PA-DSS)
  https://www.pcisecuritystandards.org/security_standards/index.php
- Payment Card Industry Data Security Standard (PCI DSS)
  https://www.pcisecuritystandards.org/security_standards/index.php
- Open Web Application Security Project (OWASP)
  http://www.owasp.org
- Center for Internet Security (CIS) Benchmarks (used for OS Hardening)
  https://benchmarks.cisecurity.org/downloads/multiform/

# Payment Application Summary

<table>
<tr><td>Payment Application Name</td><td colspan="2">Oracle Hospitality Cruise SPMS</td><td>Payment Application Version</td><td colspan="2">8.0.x</td></tr>
<tr><td>Payment Application Description</td><td colspan="5">Oracle Hospitality Cruise SPMS is a Cruise Property Management System that enables registration of the Guest/Crew payment type to its account. One of its supported payment types is by credit/debit card. To identify the type of Credit Card payment, we will need to read the card using a supported card swipe device that recognizes the card type from the PAN number, or the information can be given directly from the card authorization processing system (EMV) when we have an integration with third-party authorization system to provide batch authorization and settlement.</td></tr>
<tr><td>Typical Role of the Payment Application</td><td colspan="5">Oracle Hospitality Cruise SPMS is a payment application used on a cruise ship for processing credit card transactions and handling authorization and settlement. The authorization and settlement are sent via Online or Batch file format through a secure communications to the merchant for processing.</td></tr>
<tr><td rowspan="3">Target Market for Payment Application (check all that apply)</td><td>☐</td><td>Retail</td><td>☐</td><td>Processors</td><td>☐ Gas/Oil</td></tr>
<tr><td>☐</td><td>e-Commerce</td><td>☐</td><td colspan="2">Small/medium merchants</td></tr>
<tr><td>☒</td><td colspan="4">Others (please specify): Hospitality Cruise</td></tr>
<tr><td rowspan="3">Stored Cardholder Data</td><td colspan="5">The following is a brief description of files and tables that store cardholder data.</td></tr>
<tr><td colspan="3">File or Table Name</td><td colspan="2">Description of Stored Cardholder Data</td></tr>
<tr><td colspan="3">CRD<br>CCA<br>CCT<br>POS<br>Authorization file<br>Settlement file</td><td colspan="2">The following Cardholder Data is stored<br>• Full PAN will capture include track 1 + track 2 (Track 1 + Track 2 can be disabled via parameter)<br>• Full PAN will show on screen<br>• Full PAN will be encrypted before saving into database</td></tr>
<tr><td colspan="5">Individual access to cardholder data is logged as follows:<br>1. Every Card Registration is logged in the LOG Table under activity “GETCRD”<br>2. Whenever there is any modification on the card transactions. It is logged in the LOG table<br>3. Any access or modification to these tables via the application is logged by the table’s trigger in Oracle 12c database.</td></tr>
</table>

| | |
|---|---|
| **Components of the Payment Application** | The following are the application-vendor-developed components which comprise the payment application: |
| | List all the components of the application suite that could be installed in a typical merchant network environment, and provide a short description of each component's functionality. Examples:<br>• Management.exe – Main SPMS Guest Handling Module for Guest Details management, posting, invoice and payment handling.<br>• Quick Check In.exe – A Quick embarkation check-in module that allows capturing of credit card payment data for Guest. (as well as all other guest-related activities overview)<br>• Crew.exe – Main SPMS Crew Handling Module for Crew Details management, posting, invoice and payment handling. (as well as all other crew related activities overview)<br>• Data Import.exe (Flat File import module that allows importing of Guest/Crew data via Flat File Incl. Credit Card data import<br>• DGS Res Online.exe – This is like an online version of Data Import and directly interact with RES Online at shoreside.<br>• CMSDataXfer.exe – This interacts directly with CMS System shore side on importing Crew related data Incl. Credit Card.<br>• Credit Card Transfer.exe – Batch Credit Card Generation Interface that will generate Batch Authorization/Settlement file to various provider.<br>• Tools – Use to upload PGP key, change/update the database encryption key<br>• ADPI – use to purge the data/transaction for the database |
| **Required Third Party Payment Application Software** | The following are additional third party payment application components required by the payment application: |
| | Not Applicable |
| **Supported Database Software** | The following are database management systems supported by the payment application: |
| | The application utilizes Oracle 12c only |
| **Other Required Third Party Software** | The following are other third-party software components required by the payment application: |
| | Not applicable. |
| **Supported Operating System(s)** | The following are Operating Systems supported or required by the payment application: |
| | List Operating system(s) and versions/SP's supported. |

<table>
<tr><td></td><td>

- Windows 7 SP1 (**Windows 7 is end-of-life, if you choose to use Windows 7, please contact Microsoft for extended support**)
- Windows 8.1
- Windows 10

</td></tr>
<tr><td>Payment Application Authentication</td><td>

- The application is using PBKDF method to apply pseudorandom function, to hash the user password using random SALT along with hash value stored in database.

</td></tr>
<tr><td>Payment Application Encryption</td><td>Define here the payment application’s encryption methodology, including key management, encryption used, encryption strength, security of data storage, etc. Include encryption, access controls, truncation, etc.<br>Encryption Method: AES Encryption Method<br>Key: SHA256 Hash<br>Key Management:<br>DEK stored in the database is encrypted using AES256.<br>KEK is stored in the IIS Server local disk file and is protected using DPAPI. The user communicates with the IIS Server using a HTTPS protocol and authenticates with the user login + password before it is allowed to retrieve the KEK.<br>Once the KEK is retrieved, it will store in local disk file protected with DPAPI, there is a hash of DEK store in DB, this is used to detect if the key had changed. Once the key changed, it will retrieve the new key from IIS again.<br>Encryption Length: 256bits<br>Padding method: PKCS7<br>Mode: CBC<br>BlockSize: 128<br>** When the encryption key is due to expire in 14 days, the system prompts a warning for the user to change the encryption key via Tools.</td></tr>
<tr><td>Supported Payment Application Functionality</td><td>
<table>
<tr><td>☐</td><td>Automated Fuel Dispenser</td><td>☐</td><td>POS Kiosk</td><td>☐</td><td>Payment Gateway / Switch</td></tr>
<tr><td>☐</td><td>Card-Not-Present</td><td>☐</td><td>POS Specialized</td><td>☐</td><td>Payment Middleware</td></tr>
<tr><td>☐</td><td>POS Admin</td><td>☐</td><td>POS Suite/General</td><td>☐</td><td>Payment Module</td></tr>
<tr><td>☒</td><td>POS Face-to-Face/POI</td><td>☐</td><td>Payment Back Office</td><td>☐</td><td>Shopping Card & Store Front</td></tr>
</table>
</td></tr>
<tr><td>Payment Processing Connections</td><td>Under online scenario:<br>Initial Authorization is captured during Credit Card registration. The card is inserted into the card reader (normally provided by payment processor).<br>If the authorization is successful, a valid token or reference details with approval code details are returned to SPMS. This token or cc reference will be stored and would be used for subsequent request of incremental authorization for the same</td></tr>
</table>

| | |
|---|---|
| | card. The same token/ref is used for settlement at a later stage.<br>Currently supported payment processors are:<br>1. Servebase/PXP<br>2. Paypoint<br>3. Ingenico<br>Under batch authorization scenario:<br>Initial authorizations are generated using the Credit Card Transfer after Credit Card registration. The response authorization file from the merchant is read using the Credit Card Transfer. This response file corresponds to the initial authorization request to approve or decline the transaction.<br>Posting is performed in the Management module. If the posting amount is less than the initial authorization amount, no incremental authorization is required else the authorization is generated using the Credit Card Transfer.<br>Once the settlement completes in the Management module, a settlement authorization transaction can be generated using the Credit Card Transfer module.<br>The authorization file is encrypted with PGP encryption. The Authorization File is handled by the user with care to transmit to the merchant accordingly. The response file given by merchant is encrypted with PGP encryption as well. SPMS program will decrypt the response file using the PGP encryption, and, insert into SPMS. |
| **Description of Listing Versioning Methodology** | Oracle Hospitality Cruise SPMS versioning has four levels, Major, Minor, Patch and Build:<br><Major>.<Minor>.<Patch>.<Build Number><br>• Major changes include significant changes to the application and would have an impact on PA-DSS requirements.<br>• Minor changes include small changes such as minor enhancements and may or may not have an impact on PA-DSS requirements.<br>• Patch Release is only deployed when we need to address production bugs. This will be represented as wildcard version x. Changes at this level will not affect PA-DSS requirements or the security of the application.<br>• Build number is changed on every internal compile for testing/deployment. Every single compile has a unique build number for every version and it is not customer facing.<br>Based on the above versioning methodology the application version being listed with the PCI SSC is: 8.0.x |

# Typical Network Implementation

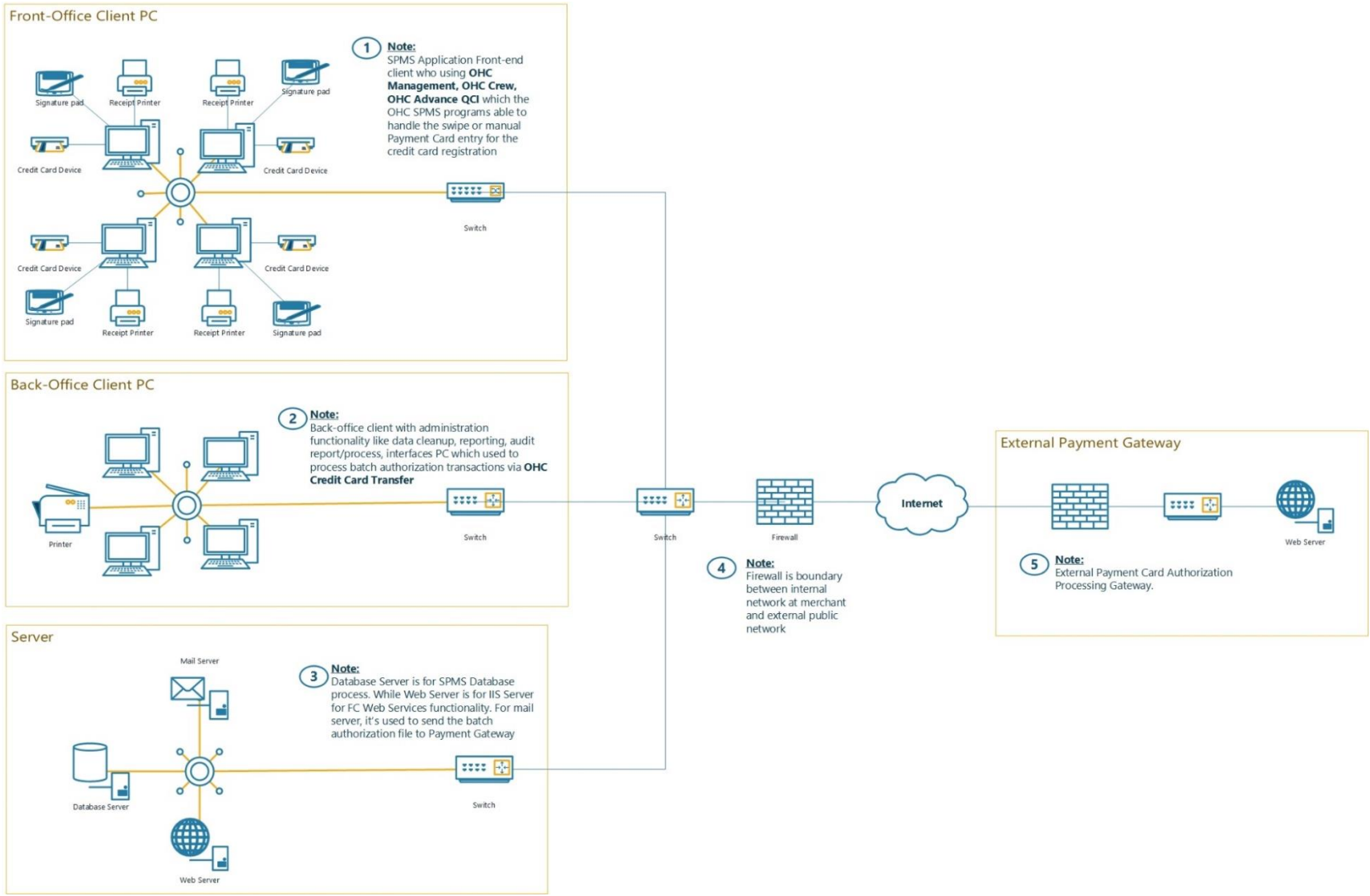


**Figure 1-1 - Typical Network Implementation**

# Credit/Debit Cardholder Dataflow Diagram

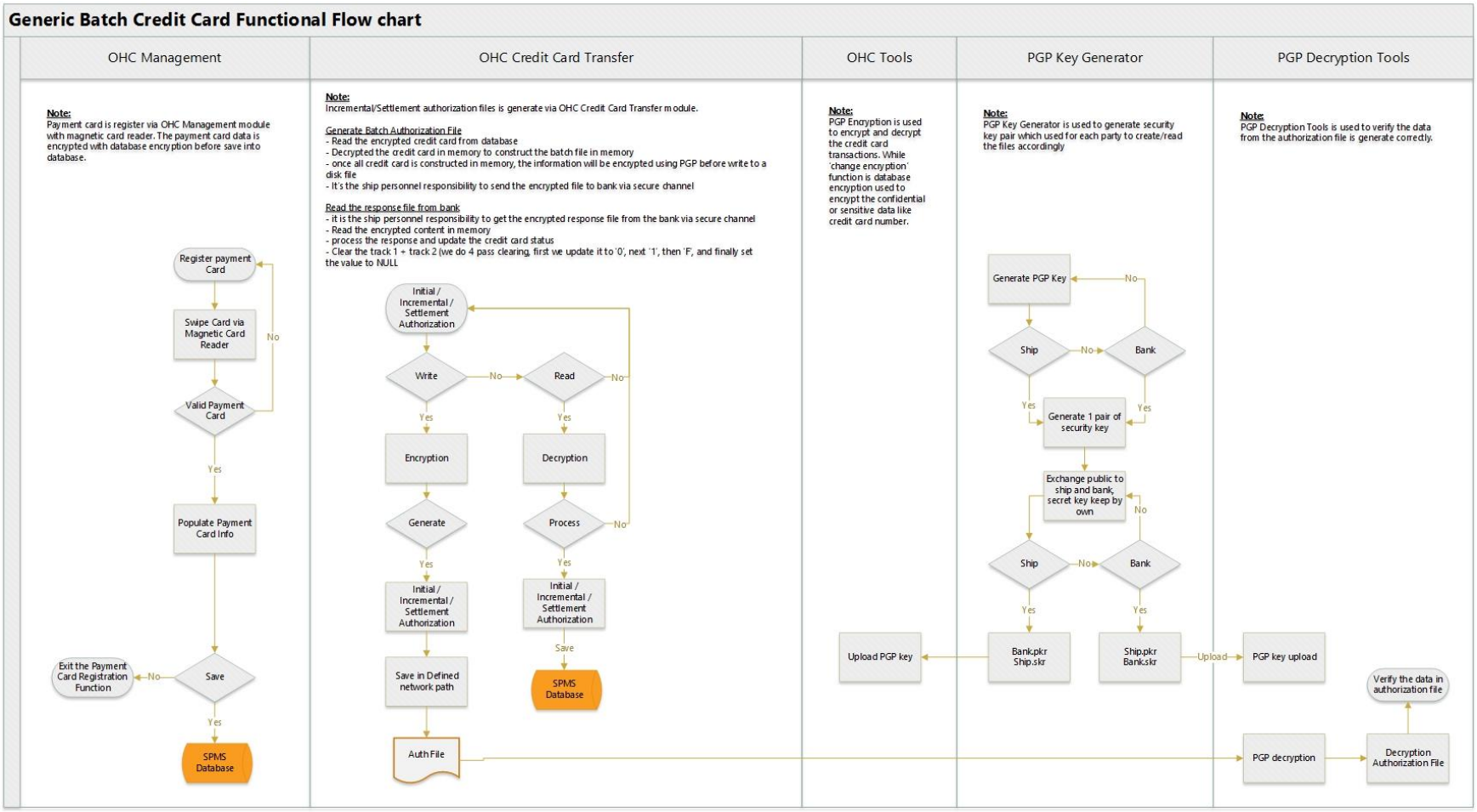


**Figure 1-2 - Credit/Debit Cardholder Dataflow Diagram**

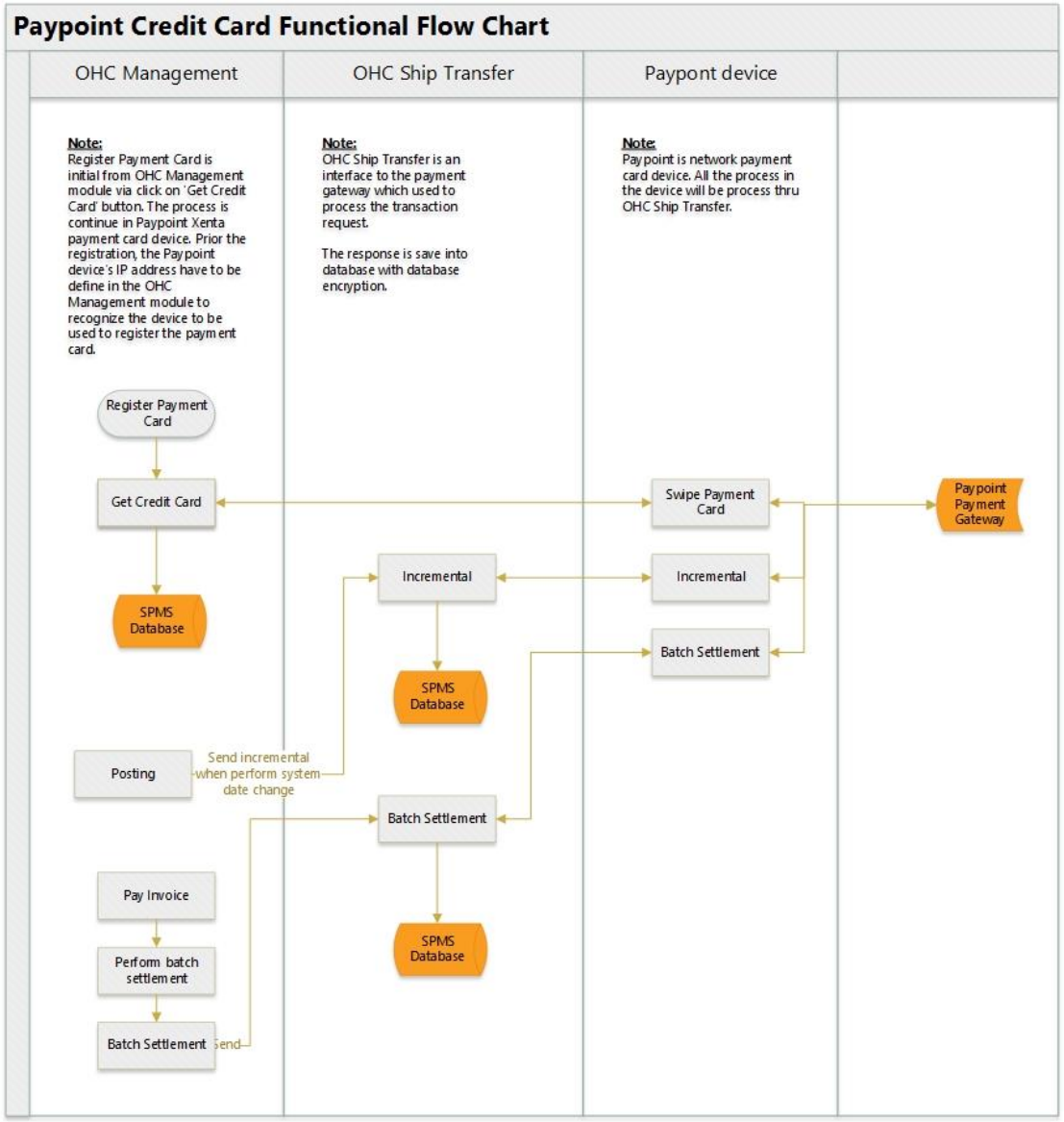


**Figure 1-3 - Paypoint Credit Card Functional Flow Chart**

# Difference between PCI Compliance and PA-DSS Validation

As the software and payment application developer, our responsibility is to be PA-DSS validated. We have tested, assessed, and validated the payment application against PA-DSS Version 3.2 with our independent assessment firm (PAQSA) to ensure that our platform conforms to industry best practices when handling, managing, and storing payment-related information.

The PA-DSS Validation is intended to ensure that Oracle Hospitality Cruise SPMS will help you facilitate and maintain PCI Compliance with respect to how the payment application handles user accounts, passwords, encryption, and other payment data related information.

The Payment Card Industry (PCI) has developed security standards for handling cardholder information in a published standard called the PCI Data Security Standard (DSS). The security requirements defined in the DSS apply to all members, merchants, and service providers that store, process, or transmit cardholder data.

The PCI DSS requirements apply to all system components within the payment application environment, which is defined as any network device, host, or application, included in, or connected to, a network segment where cardholder data is stored, processed or transmitted.

PCI Compliance is an assessment of your actual server (or hosting) environment called the Cardholder Data Environment (CDE). It is the responsibility of you, as the merchant, and your hosting provider to work together to use PCI compliant architecture with proper hardware & software configurations and access control procedures.

## The 12 Requirements of the PCI DSS:

**Build and Maintain a Secure Network and Systems**

1. Install and maintain a firewall configuration to protect cardholder data
2. Do not use vendor-supplied defaults for system passwords and other security parameters

**Protect Cardholder Data**

3. Protect stored cardholder data
4. Encrypt transmission of cardholder data across open, public networks

**Maintain a Vulnerability Management Program**

5. Protect all systems against malware and regularly update anti-virus software or programs
6. Develop and maintain secure systems and applications

**Implement Strong Access Control Measures**

7. Restrict access to cardholder data by business need-to-know
8. Identify and authenticate access to system components
9. Restrict physical access to cardholder data

**Regularly Monitor and Test Networks**

10. Track and monitor all access to network resources and cardholder data
11. Regularly test security systems and processes

**Maintain an Information Security Policy**

12. Maintain a policy that addresses information security for all personnel

# 2 Considerations for the Implementation of Payment Application in a PCI-Compliant Environment

The following areas must be considered for proper implementation in a PCI-Compliant environment.

- Remove Historical Sensitive Authentication Data
- Handling of Sensitive Authentication Data
- Secure Deletion of Cardholder Data
- All PAN is masked by default
- Cardholder Data Encryption & Key Management
- Removal of Historical Cryptographic Material

## Remove Historical Sensitive Authentication Data (PA-DSS 1.1.4)

Sensitive Authentication Data (SAD) includes security-related information (including but not limited to card validation codes/values, full track data (from the magnetic stripe or equivalent on a chip), PINs, and PIN blocks) used to authenticate cardholders and/or authorize payment card transactions. Refer to the Glossary of Terms, Abbreviations, and Acronyms in the PCI SSC for the definition of Sensitive Authentication Data.

The following previous versions of Oracle Hospitality Cruise SPMS stored SAD, including

- 7.30.x

Historical SAD stored by previous versions of Oracle Hospitality Cruise SPMS must be securely deleted and removal is absolutely necessary for PCI DSS compliance. Oracle Hospitality Cruise SPMS includes capabilities to securely delete historical SAD as follows:

When authorization response is received from Credit Card authorization server, the track data is automatically removed by the Credit Card Interface.

## Handling of Sensitive Authentication Data (PA-DSS 1.1.5)

Oracle Hospitality Cruise SPMS store Sensitive Authenticate Data (SAD). The following guideline must be followed when dealing with SAD used for pre-authorization (swipe data, validation values or codes, PIN or PIN block data):

- Collect SAD only when needed to solve a specific problem
- Store such data only in specific, known locations with limited access.
- Collect only the limited amount of data needed to solve a specific problem
- Encrypt such data while stored
- Securely delete such data immediately after use

Oracle Hospitality Cruise SPMS automatically securely deletes Cardholder Data by

- Track Data is removed automatically when initial Authorization is received from Credit Card provider. (It do 4 pass clearing, first update it to ALL ‘0’, next all ‘1’, then ‘F’, finally the value set to NULL)

- Authorization/settlement file is encrypted with PGP encryption. The file is handled by the user with care.
- We do not perform memory clearance for cardholder data.

It is against Oracle Hospitality Cruise's policy to collect any Sensitive Authentication Data (including any track data, card validation codes or PIN data) or Cardholder Data for any reason. Our troubleshooting processes do not require the collection of Sensitive Authentication Data or Cardholder Data, nor should it be accepted from a customer.

# Secure Deletion of Cardholder Data (PA-DSS 2.1)

The following guidelines must be followed when dealing with Cardholder Data (Primary Account Number (PAN); Cardholder Name; Expiration Date; or Service Code):

- A customer-defined retention period must be defined with a business justification.

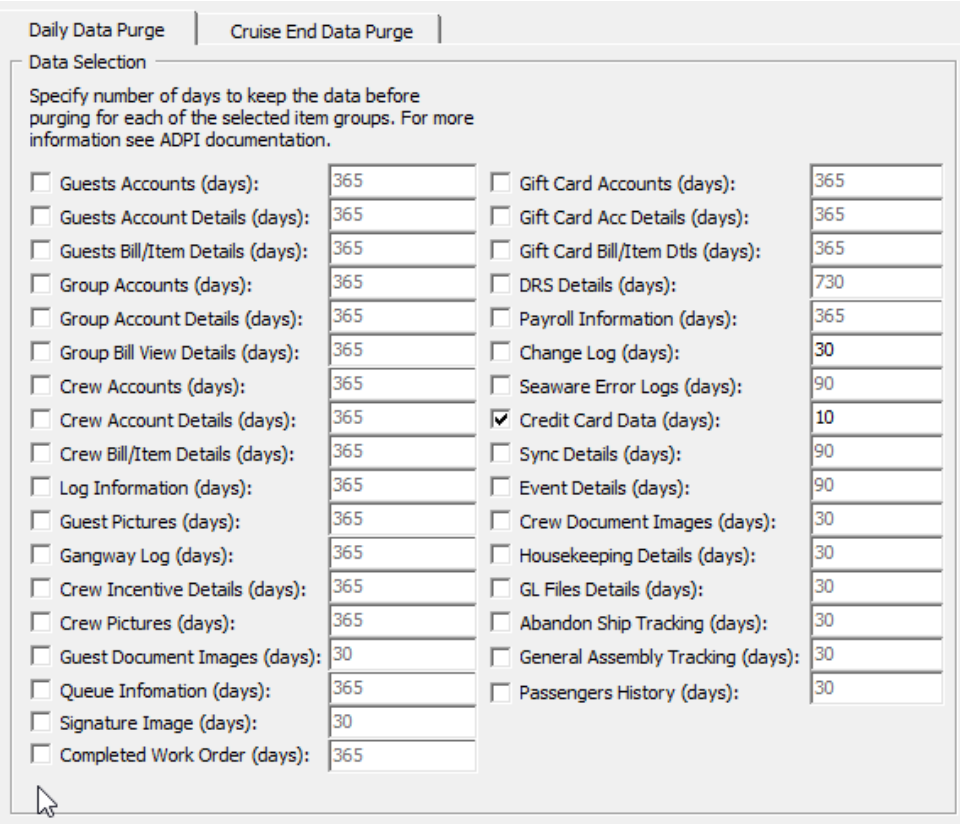


**Figure 2-1 - ADPI Configuration Screen**

- Cardholder data exceeding the customer-defined retention period or when no longer required for legal, regulatory, or business purposes must be securely deleted.
- Here are the locations of the cardholder data you must securely delete: SPMS Database Schema, CRD, CCA, CCT, POS table
- In order to remove the Credit Card related data from the database schema:
  - Choose 'Credit Card Data' – this option is to remove CRD, CCA, and CCT table's data.
  - Then, define the business operation justified retention period. After the purge process completes, Data will retain as per duration defined in the application.

- To securely delete Cardholder Data, you must do the following:

Oracle Hospitality Cruise SPMS automatically securely deletes Cardholder Data by:

  - Track Data is removed automatically when initial Authorization is received from Credit Card provider. (It do 4 pass clearing, first update it to ALL '0', next all '1', then 'F', finally the record is removed)
  - Authorization/settlement file is encrypted with PGP encryption. The file is handled by the user with care.
  - We do not perform memory clearance for cardholder data.

- All underlying software (this includes operating systems and/or database systems) must be configured to prevent the inadvertent capture of PAN. Instructions for configuring the underlying operating systems and/or databases can be found in **Appendix A**.

# All PAN is Masked by Default (PA-DSS 2.2)

Oracle Hospitality Cruise SPMS masks all PAN by default in all locations that display PAN (screens, paper receipts, printouts, reports, etc.) by displaying only

All but the last four digits of the PAN number is masked

The payment application displays PAN in the following locations:

- printed receipts – optional
- all generated card reports in the reports menu; these include the following reports: customer invoice report with payment – optional
- All PAN is masked by Default and, the PAN is controlled by access right.

Choose whether your application displays full PAN or not and then update based on the functionality of your application. Below are the module/screen to view the masked PAN.

- Card Entry Screen (Manual and Swipe Entry) – Full PAN is displayed, which use as verification against the credit card given on registration.
- Invoice Payment Screen – Full PAN/ Masked PAN
- Quick Check-In Reservation Screen – Full PAN or Masked PAN
- Guest Reservation Screen – Full PAN /Masked PAN
- Pop-up message Guest Reservation Screen – Full PAN
- Credit Card Authorization Screen – Full PAN/ Masked PAN
- Credit Card Settlement Screen – Full PAN/Masked PAN
- Passenger Invoices Report (Final Statement Invoice, Detail Statement Invoice)
- User Log File Output – Truncated to show Last 4

Oracle Hospitality Cruise SPMS does have the ability to display full PAN and this is controlled by the user access right.

# Cardholder Data Encryption & Key Management (PA-DSS 2.3, 2.4, and 2.5)

Oracle Hospitality Cruise SPMS stores cardholder data and has the ability to output PAN data for storage outside of the payment application. All PAN must be rendered unreadable anywhere it is stored (including data on portable digital media, backup media, and in logs. The payment application uses an encryption methodology with

statically generated keys to automatically encrypt all locations/methods where cardholder data is stored.

A list of all locations where PAN may be output by the merchant includes:

- Interface Log for debugging purposes – All PAN output is encrypted.

NOTE: All PAN output by the merchant, to be stored in the merchant environment must be rendered unreadable using strong cryptographic methods.

The following key management activities must be performed per PCI DSS:

- You must restrict access to encryption keys to the fewest number of custodians necessary.
- You must store encryption keys securely in the fewest possible locations and forms.
- Key custodians must sign the Key Custodian form provided in Appendix A to acknowledge that they understand and accept their key-custodian responsibilities.
- Generation of strong cryptographic keys.
  The application uses AES 256bit with SHA hashing
- Secure cryptographic key distribution.
  They key is not distributed outside the system.
- Secure cryptographic key storage.
- DEK is stored in the database and encrypted using AES256.

  KEK is stored in IIS Server local disk file protected using DPAPI, the Client will communicate with the IIS Server using HTTPS and authenticate with user login + password before it is allowed to retrieve the KEK.

  Once the KEK is retrieved, it will store in local disk file protected with DPAPI. There is a hash of DEK store in DB, this is use to detect if the key had change. Once the key is found to have changed, it will retrieve the new key from IIS again.
- Cryptographic key changes for keys that have reached the end of their crypto period.
  - The defined crypto period for each key type is
    - The key will expire after 1 year and is hard-coded
  - Oracle Hospitality Cruise SPMS enforces key changes at the end of the defined crypto period by
    - All application will stop loading when the key is expired except for the key changed application tool.
- Retire or replace keys when the integrity of the key has been weakened and/or when known or suspected compromise. If retired or replaced cryptographic keys are retained, the application cannot use these keys for encryption operations.
  The key is destroyed upon change; we do not keep the history of the key.
- Manual clear-text cryptographic key-management procedures require split knowledge and dual control of keys.
  - The following key types are manual clear-text cryptographic keys: None
- In order to enforce split knowledge and dual control,

  The key is split into two entries. One, person A is to enter first part of the Key in Passphrase 1 and Confirm Passphrase 1. Second person is to enter the key in Passphrase 2 and Confirm Passphrase 2.

  No one person knows the complete key.

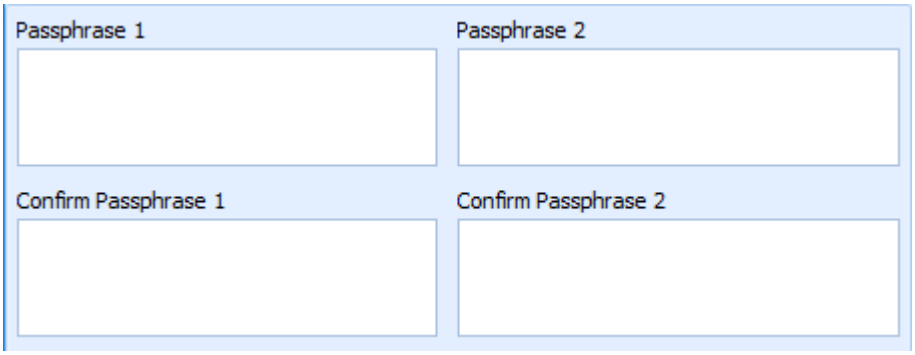


**Figure 2-2 - Passphrase Input Field**

Prevention of unauthorized substitution of cryptographic keys.
DEK is protected with KEK using AES256. KEK is protected with DPAPI. Hash of DEK is stored in DB to prevent unauthorized modification.

The following is PGP key management functionality (PGP is an encryption program that provided cryptographic privacy and authentication for data communication.)

- The Public and Private PGP key is upload into database thru the Oracle Hospitality Cruise SPMS program, and the key is encrypted with AES methodology before stored into database
- The physical Public and Private PGP key is deleted and removed from the local folder and recycle bin once the keys are uploaded into the database.

# Removal of Historical Cryptographic Material (PA-DSS 2.6)

Oracle Hospitality Cruise SPMS has the following versions that previously encrypt the cardholder data:

- 7.30.x

If the historical Cardholder data is no longer needed, the following must be completed to ensure it is PCI Compliance:

- All cryptographic material for previous versions of the payment application (encryption keys and encrypted cardholder data) must be rendered irretrievable when no longer needed.
- To render historical encryption keys and/or cryptograms irretrievable you must do the following to decrypt and re-encrypt the data with new encryption keys:
    - Oracle Hospitality Cruise SPMS uses previously validated encryption algorithms that are PCI Compliant. Therefore, there is no need to render historical cryptographic keys or cryptograms irretrievable as they are still in use by the payment application.

# Set up Strong Access Controls (PA-DSS 3.1 and 3.2)

The PCI DSS requires that access to all systems in the payment processing environment be protected through the use of unique users and complex passwords. Unique user accounts indicate that every account used is associated with an individual user and/or process with no use of generic group accounts used by more than one user or process.

The following roles and default accounts within the application have administrative access:

- Internal Administrator Account for debugging purpose only

All authentication credentials are generated and managed by the application. Secure authentication is enforced automatically by the payment application for all credentials by the completion of the initial installation and for any subsequent changes (for example, any changes that result in user accounts reverting to default settings, any changes to existing account settings, or changes that generate new accounts or recreate existing accounts). To maintain PCI DSS compliance the following 11 points must be followed per the PCI DSS:

- The payment application must not use or require the use of default administrative accounts for other necessary or required software (for example, database default administrative accounts) (PCI DSS 2.1 / PA-DSS 3.1.1)
- The payment application must enforce the changing of all default application passwords for all accounts that are generated or managed by the application, by the completion of installation and for subsequent changes after the installation (this applies to all accounts, including user accounts, application and service accounts, and accounts used by Oracle Hospitality Cruise SPMS system only for support purposes) (PCI DSS 2.1 / PA-DSS 3.1.2)
- The payment application must assign unique IDs for all user accounts. (PCI DSS 8.1.1 / PA-DSS 3.1.3)
- The payment application must provide at least one of the following three methods to authenticate users: (PCI DSS 8.2 / PA-DSS 3.1.4)
  a. Something you know, such as a password or passphrase
  b. Something you have, such as a token device or smart card
  c. Something you are, such as a biometric
- The payment application must NOT require or use any group, shared, or generic accounts and passwords (PCI DSS 8.5 / PA-DSS 3.1.5)
- The payment application requires passwords to be at least seven characters and to include both numeric and alphabetic characters (PCI DSS 8.2.3 / PA-DSS 3.1.6)
- The payment application requires passwords to be changed at least every 90 days (PCI DSS 8.2.4 / PA-DSS 3.1.7)
- The payment application keeps password history and requires that a new password is different than any of the last four passwords used (PCI DSS 8.2.5 / PA-DSS 3.1.8)
- The payment application limits repeated access attempts by locking out the user account after not more than six logon attempts (PCI DSS 8.1.6 / PA-DSS 3.1.9)
- The payment application sets the lockout duration to a minimum of 30 minutes or until an administrator enables the user ID. (PCI DSS 8.1.7 / PA-DSS 3.1.10)
- The payment application requires the user to re-authenticate to re-activate the session if the application session has been idle for more than 15 minutes. (PCI DSS 8.1.8 / PA-DSS 3.1.11)

# PCI compliant password in Oracle Hospitality Cruise Shipboard Property Management System

To comply with the PCI Data Security Standard, change your Oracle Hospitality Cruise SPMS's Username and Password.

1. Navigate to **Utilities tab** in Launch Panel module.

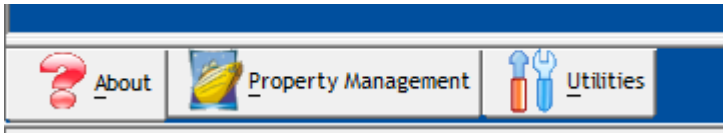


**Figure 2-3 - Launch Panel Tabs**

2. Double-click **User Security** to open the User Security program.
3. Click the **Change password** to change the user password and then click **Apply**.

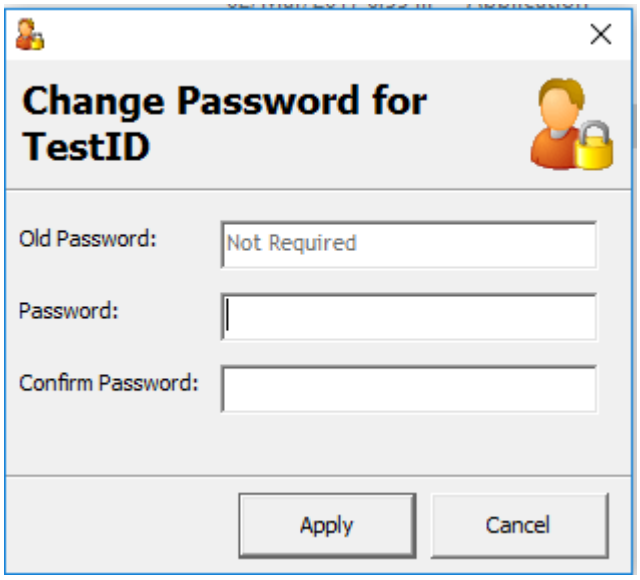


**Figure 2-4 - User Password Change Screen**

You must assign a strong password to any default accounts (even if they will not be used), and then disable or do not use the accounts.

To ensure strict access control of the Oracle Hospitality Cruise SPMS application, always assign unique usernames and complex passwords to each account. Oracle Hospitality Cruise mandates applying these guidelines to not only program password but to Microsoft Windows operating system passwords as well. Furthermore, Oracle Hospitality Cruise advises users to control access, via unique usernames and PCI-compliant complex passwords, to any PCs, servers, and databases with payment applications and cardholder data.

## Creating Secure Password

To comply with PCI Data Security Standard, ensure the following options in the Oracle Hospitality Cruise SPMS program are configured as shown below:

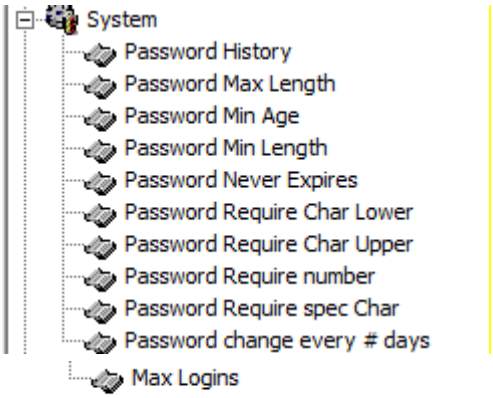


**Figure 2-5 - Secure Password**

In the Oracle Hospitality Cruise SPMS program, Administrative module, from the main menu, navigate **Administration, System Setup, Database Parameters**, ensure these available options are configured as below:

1. Ensure the Password History is at least 4
2. Ensure the Password Max Length is at least 14 characters
3. Ensure the Password Min Age is 1
4. Ensure the Password Min Length is at least 8 characters
5. Ensure the Password Never Expires is 0 (disabled)
6. Ensure the Password Require Char Lower is at least 1 character
7. Ensure the Password Require Char Upper is at least 1 character
8. Ensure the Password Require number is at least 1 number
9. Ensure the Password Require spec char is at least 1 character
10. Ensure the Password change every # days not greater than 90 days
11. Ensure the Max Logins is not greater than 6

# Properly Train and Monitor Admin Personnel

It is your responsibility to institute proper personnel management techniques for allowing admin user access to cardholder data, site data, etc. You can control whether each individual admin user can see credit card PAN (or only last 4).

In most systems, a security breach is the result of unethical personnel. Pay special attention to whom you entrust your admin site to and who you allow to view full decrypted and unmasked payment information.

# Log Settings must be Compliant (PA-DSS 4.1.b and 4.4.b)

**4.1.b**: Oracle Hospitality Cruise SPMS has PA-DSS compliant logging enabled by default. This logging is not configurable and may not be disabled.

Implement automated assessment trails for all system components to reconstruct the following events:

10.2.1 All individual user accesses to cardholder data from the application
10.2.2 All actions taken by any individual with administrative privileges in the application
10.2.3 Access to application audit trails managed by or within the application
10.2.4 Invalid logical access attempts
10.2.5 Use of the application's identification and authentication mechanisms (including but not limited to creation of new accounts, elevation of privileges, etc.) and all changes, additions, deletions to application accounts with root or administrative privileges
10.2.6 Initialization, stopping, or pausing of the application audit logs
10.2.7 Creation and deletion of system-level objects within or by the application

Record at least the following assessment trail entries for all system components for each event from 10.2.x above:

10.3.1 User identification
10.3.2 Type of event
10.3.3 Date and time
10.3.4 Success or failure indication
10.3.5 Origination of event
10.3.6 Identity or name of affected data, system component, or resource.

Disabling or subverting the logging function of Oracle Hospitality Cruise SPMS in any way will result in non-compliance with PCI DSS. You can access logs by:

Oracle provides a comprehensive audit trail within SPMS that allows privileged users to track Oracle Hospitality Cruise specific activities. The open database structure allows anyone with system level access to access the database server (Oracle) and system components covered under this requirement, and thus would require logging of user access and activity. Oracle Hospitality Cruise strongly recommends logging of activity on the database server. The log accessibility depends on the user access right.

**4.4.b**: Oracle Hospitality Cruise SPMS facilitates centralized logging.

The Oracle Hospitality Cruise User Activity Log records a 'history' of user activity in the Oracle Hospitality Cruise SPMS database and is accessed via Security>User Logfile. This logs data related to credit card registration, authorization, settlement, batch authorization, batch settlement and others transactions. The log file can be export to supported workstation's format. (For example, if the workstation installed Microsoft Office, then it will able to export to Office file)

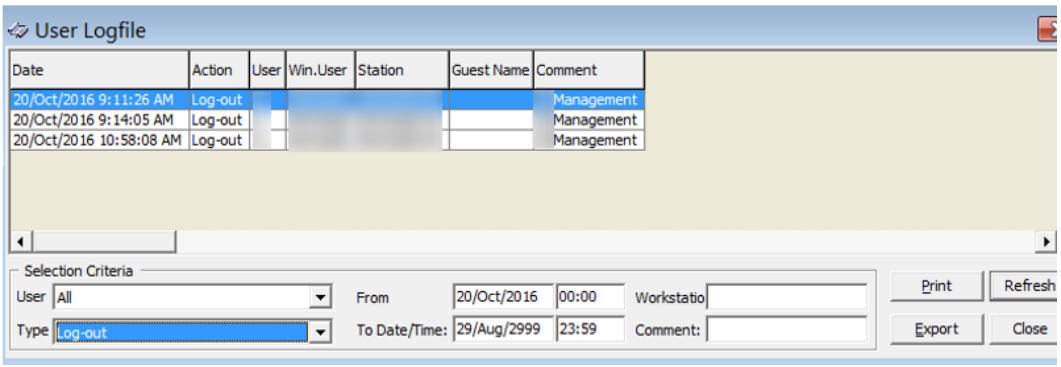


**Figure 2-6 - User Log File Screen**

# Lockout duration configuration (PCI DSS 8.1.6 / PA-DSS 3.1.9)

To comply with PCI Data Security Standard, ensure the following options in the Oracle Hospitality Cruise SPMS program are configure as shown below:

**Figure 2-7 - Lockout Duration Configuration**

In the Oracle Hospitality Cruise SPMS program, Administrative module, from the main menu, navigate **Administration, System Setup, Database Parameters**, ensure these available options are configured as below:

1. Ensure the Lockout Minutes is 30
2. Ensure the Max Login at 6
3. Ensure the Idle Minutes is 15

# Test Data and Accounts: (PA-DSS 5.1.2 & 5.1.3)

Oracle Hospitality Cruise removes all test data and test accounts before the application is released to customers. In addition, all custom payment application accounts, user ID's and passwords are removed before payment application is released to customers.

During a new/upgrade deployment, installer will execute PL/SQL script to remove all older test data from the database (if we detected any created by the customer and we never supply test data for deployment).

# 3 PCI-Compliant Wireless Settings (PA-DSS 6.1.a and 6.2.b)

Oracle Hospitality Cruise SPMS *does not* support wireless technologies. However, should the merchant implement wireless access within the cardholder data environment, the following guidelines for secure wireless settings must be followed per PCI Data Security Standard 1.2.3, 2.1.1 and 4.1.1:

**1.2.3**: Perimeter firewalls must be installed between any wireless networks and systems that store cardholder data, and these firewalls must deny or control (if such traffic is necessary for business purposes) any traffic from the wireless environment into the cardholder data environment.

**2.1.1**: Change wireless vendor defaults per the following 5 points:

1. Encryption keys must be changed from default at installation, and must be changed anytime anyone with knowledge of the keys leaves the company or changes positions.
2. Default SNMP community strings on wireless devices must be changed.
3. Default passwords/passphrases on access points must be changed.
4. Firmware on wireless devices must be updated to support strong encryption for authentication and transmission over wireless networks.
5. Other security-related wireless vendor defaults, if applicable, must be changed.

**4.1.1**: Industry best practices (for example, IEEE 802.11.i) must be used to implement strong encryption for authentication and transmission of cardholder data.

Note: The use of WEP as a security control was prohibited as of June 30, 2010.

# 4 Services and Protocols (PA-DSS 8.2.c)

The application must only use or require the use of necessary and secure e-services, protocols, daemons, components. PCI requires that you list all required protocols, services and dependent software and hardware that are necessary for any functionality of the payment application, including those provided by third parties.

Oracle Hospitality Cruise SPMS does not require the use of any insecure services or protocols. Here are the services and protocols that Oracle Hospitality Cruise SPMS does require:

TLS1.1/TLS1.2 – Depending on IIS configuration by customer site

HTTPS – Used in Web Service

## Never Store Cardholder Data on Internet-Accessible Systems (PA-DSS 9.1.c)

Never store cardholder data on Internet-accessible systems (for example, web server and database server must not be on the same server.)

## PCI-Compliant Remote Access (PA-DSS 10.1)

The PCI standard requires that if employees, administrators, or vendors are granted remote access to the payment processing environment; access should be authenticated using a two-factor authentication mechanism. The means two of the following three authentication methods must be used:

1. Something you know, such as a password or passphrase - user id/password for remote access
2. Something you have, such as a token device or smart card – Token Device
3. Something you are, such as a biometric – Not used

## PCI-Compliant Delivery of Updates (PA-DSS 7.2.3, 10.2.1.a)

Oracle Hospitality Cruise SPMS delivers patches and updates in a secure manner:

- How you communicate the availability of new patches and updates to customers.

  Normally, email notification is sent to the customer.
- Timely development and deployment of patches and updates.
  Patches are delivered in an average of twice a year.
- Delivery in a secure manner with a known chain-of-trust.
  Customers is required to download patches themselves from MOS.
  (please check on the path :
  https://support.oracle.com/epmos/faces/MosIndex.jspx?_afrLoop=44525
  1738840151&_afrWindowMode=0&_adf.ctrl-state=10af961qzk_4)
- Delivery in a manner that maintains the integrity of the deliverable.
  MOS.
- Integrity testing of the patch or update by the target system prior to installation: There is a small tool program written to make sure all modules/interfaces are compiled correctly and no zero (0) size assembly are detected. As a development company, we keep abreast of the relevant security concerns and vulnerabilities in our area of development and expertise.

We do this by using a Code Scanning Tool such as Fortify, doing code review, and extensive testing by QA team.

Once we identify a relevant vulnerability, we work to develop & test a patch that helps protect Oracle Hospitality Cruise SPMS against the specific, new vulnerability. We attempt to publish a patch within 30 days of the identification of the vulnerability. We will then contact vendors and dealers to encourage them to install the patch. Typically, merchants are expected to respond quickly to and install available patches within 30 days.

We do not deliver software and/or updates via remote access to customer networks. Instead, software and updates are available by uploading it onto approved Oracle Automatic Release Update

My Oracle Support is the key website service for providing interactions with Global Customer Support (GCS) for Oracle programs and hardware, including (Service Request) SR access, knowledge search/browse, support communities and technical forums.
My Oracle Support employs the following security controls:

- My Oracle Support is an HTTPS extranet website service using Secure Socket Layer (SSL) encryption.
- Your registration on My Oracle Support uses a unique Customer Support Identifier (CSI) linked to your Support contract(s).
- **Delivery in a manner that maintains the integrity of the deliverable.**

  When a patch is downloaded from My Oracle Support's Automated Release Updates (ARU) page, the patch's digital signature should be verified. This is a relatively simple manual process.

  There are several free file integrity validation tools available on the web that can verify the Message Digest 5 (MD5) or Secure Hash Algorithm (SHA-1) checksum for the downloaded patch file. You can use a tool like the Microsoft File Checksum Integrity Verifier, or a similar MD5 and SHA-1 checksum utility.

  Choose and download the validation tool that you want to use. Once a patch has been downloaded, run your file integrity validation tool against it and compare the hash value generated by the validation tool to the hash value that corresponds to the patch on the ARU page. Both hash values should exactly match each other to confirm the file's integrity. Once you have validated the patch file integrity, deploy the patch as soon as possible.

# PCI-Compliant Remote Access (PA-DSS 10.3.2.a)

The PCI standard requires that if employees, administrators, or vendors are granted remote access to the payment processing environment; access should be authenticated using a two-factor authentication mechanism (username/ password and an additional authentication item such as a token or certificate).

In the case of vendor remote access accounts, in addition to the standard access controls, vendor accounts should only be active while access is required to provide service. Access rights should include only the access rights required for the service rendered, and should be robustly audited.

If users and hosts within the payment application environment may need to use third-party remote access software such as Remote Desktop (RDP)/Terminal Server, etc. to access other hosts within the payment processing environment, special care must be taken.

In order to be compliant, every such session must be encrypted with at least 128-bit encryption (in addition to satisfying the requirement for two-factor authentication required for users connecting from outside the payment processing environment). For <RDP/Terminal Services> this means using the high encryption setting on the server, and for <PCAnywhere> it means using symmetric or public key options for encryption. Additionally, the PCI user account and password requirements will apply to these access methods as well.

When requesting support from a vendor, reseller, or integrator, customers are advised to take the following precautions:

- Change default settings (such as usernames and passwords) on remote access software (e.g. VNC).
- Allow connections only from specific IP and/or MAC addresses.
- Use strong authentication and complex passwords for logins according to PA-DSS 3.1.1 – 3.1.10 and PCI DSS 8.1, 8.3, and 8.5.8-8.5.15.
- Enable encrypted data transmission according to PA-DSS 12.1 and PCI DSS 4.1.
- Enable account lockouts after a certain number of failed login attempts according to PA-DSS 3.1.8 and PCI DSS 8.5.13.
- Require that remote access takes place over a VPN via a firewall as opposed to allowing connections directly from the internet.
- Enable logging for auditing purposes.
- Restrict access to customer passwords to authorized reseller/integrator personnel.
- Establish customer passwords according to PA-DSS 3.1.1 – 3.1.10 and PCI DSS Requirements 8.1, 8.2, 8.4, and 8.5.

# Data Transport Encryption (PA-DSS 11.1.b)

The PCI DSS requires the use of strong cryptography and encryption techniques with at least a 128 bit encryption strength (either at the transport layer with TLS or IPSEC; or at the data layer with algorithms such as RSA or Triple-DES) to safeguard cardholder data during transmission over public networks (this includes the Internet and the Internet accessible DMZ network segments).

PCI DSS Requirement 4.1: Use strong cryptography and security protocols such as transport layer security (TLS 1.1/TLS 1.2) and Internet protocol security (IPSEC) to safeguard sensitive cardholder data during transmission over open, public networks.

Examples of open, public networks that are in scope of the PCI DSS are:

- The Internet
- Wireless technologies
- Global System for Mobile Communications (GSM)
- General Packet Radio Service (GPRS)

Refer to the Figure 1-2 - Credit/Debit Cardholder Dataflow Diagram" for an understanding of the flow of encrypted data associated with Oracle Hospitality Cruise SPMS

# PCI-Compliant Use of End-User Messaging Technologies (PA-DSS 11.2.b)

Oracle Hospitality Cruise SPMS does not allow or facilitate the sending of PANs via any end user messaging technology (for example, e-mail, instant messaging, and chat).

# Non-Console Administration and Multi-Factor Authentication (PA-DSS 12.1, 12.2)

Although Oracle Hospitality Cruise SPMS does not support non-console administration and we do not recommend using non-console administration, should you ever choose to do this, you must use SSH, VPN, or TLS 1.1 or higher for encryption of this non-console administrative access along with a multi-factor authentication solution.

# Network Segmentation

The PCI DSS requires that firewall services be used (with NAT or PAT) to segment network segments into logical security domains based on the environmental needs for internet access. Traditionally, this corresponds to the creation of at least a DMZ and a trusted network segment where only authorized, business-justified traffic from the DMZ is allowed to connect to the trusted segment. No direct incoming internet traffic to the trusted application environment can be allowed. Additionally, outbound internet access from the trusted segment must be limited to required and justified ports and services.

Refer to the standardized Network diagram for an understanding of the flow of encrypted data associated with Oracle Hospitality Cruise SPMS.

# Maintain an Information Security Program

In addition to the preceding security recommendations, a comprehensive approach to assessing and maintaining the security compliance of the payment application environment is necessary to protect the organization and sensitive cardholder data.

The following is a very basic plan every merchant/service provider should adopt in developing and implementing a security policy and program:

- Read the PCI DSS in full and perform a security gap analysis. Identify any gaps between existing practices in your organization and those outlined by the PCI requirements.
- Once the gaps are identified, determine the steps to close the gaps and protect cardholder data. Changes could mean adding new technologies to shore up firewall and perimeter controls, or increasing the logging and archiving procedures associated with transaction data.
- Create an action plan for on-going compliance and assessment.
- Implement, monitor and maintain the plan. Compliance is not a one-time event. Regardless of merchant or service provider level, all entities should complete annual self-assessments using the PCI Self-Assessment Questionnaire.
- Call in outside experts as needed.

# Application System Configuration

Below are the operating systems and dependent application patch levels and configurations supported and tested for continued PCI DSS compliance.

- Microsoft Windows 7 Professional, Microsoft Windows 8.1, Microsoft Windows 10 Professional. All latest updates and hot-fixes should be tested and applied.
- 4Gb of RAM minimum, 8GB or higher recommended for Payment Application
- 128Gb of available hard-disk space
- TCP/IP network connectivity
- Oracle 12c. All latest updates and hot-fixes should be tested and applied

# Payment Application Initial Setup & Configuration

# Performing Maintenance

We use ADPI tool to pre-select how long historical data are to be kept.

- Credit Card Data is checked default which to compliance with PA-DSS.
- The Credit Card Data purges the orphaned credit card data, authorization and settlement that were entered a specific number of days ago.

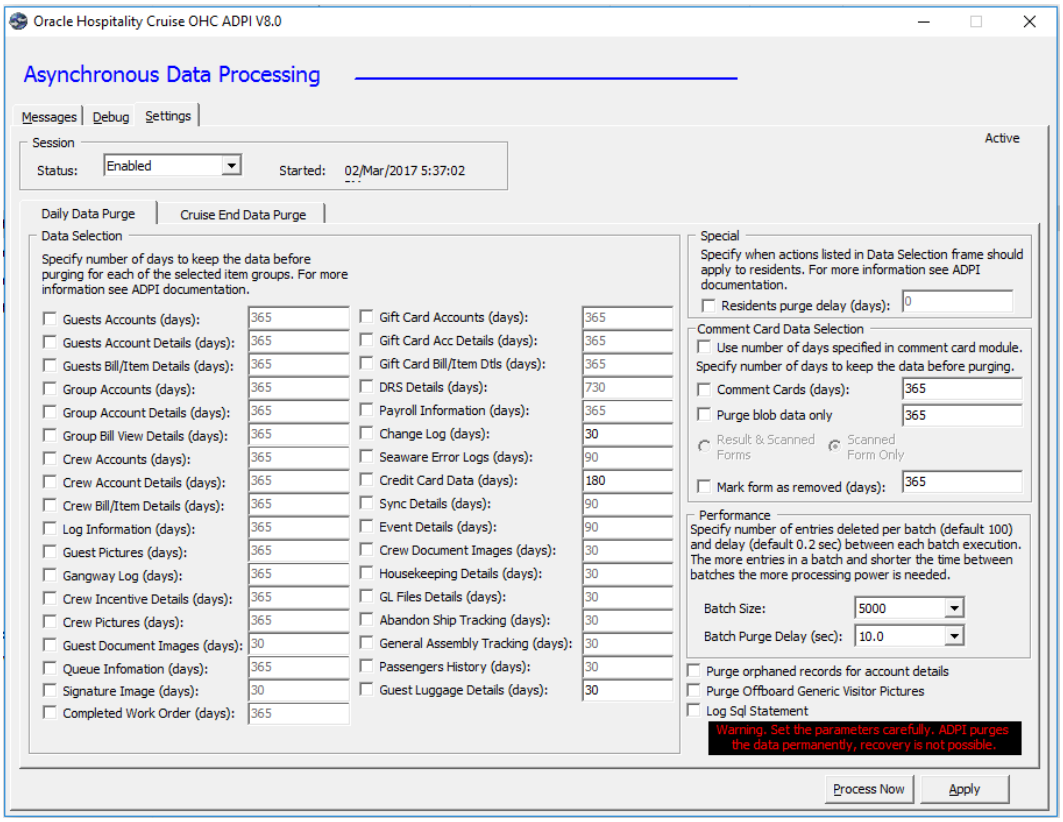


**Figure 4-1 - Performing Maintenance**

1. Start the application **ADPI.exe**
2. Check on the respective data to be purged.
3. Define the retention duration for the data.
4. Click **Process Now** to purge the selected data.

# Updating your Encryption Key on a Periodic Basis

1. When the encryption key is due to expire in 14 days, the system prompts below warning, informing the shipboard to renew the encryption key.

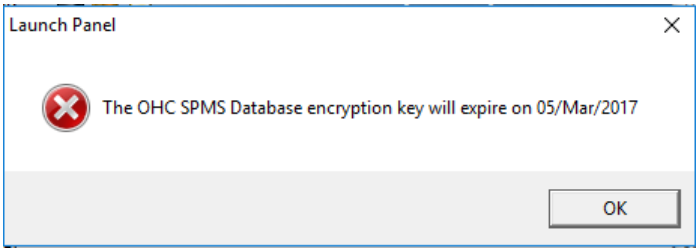


**Figure 4-2 - Day Encryption Key Expiry Warning**

2. Launch the **Tools.exe**.
3. At the login screen, enter your login credentials.
4. After a successful authentication, a user with access to the application will see the main screen as shown in Figure 4-3.

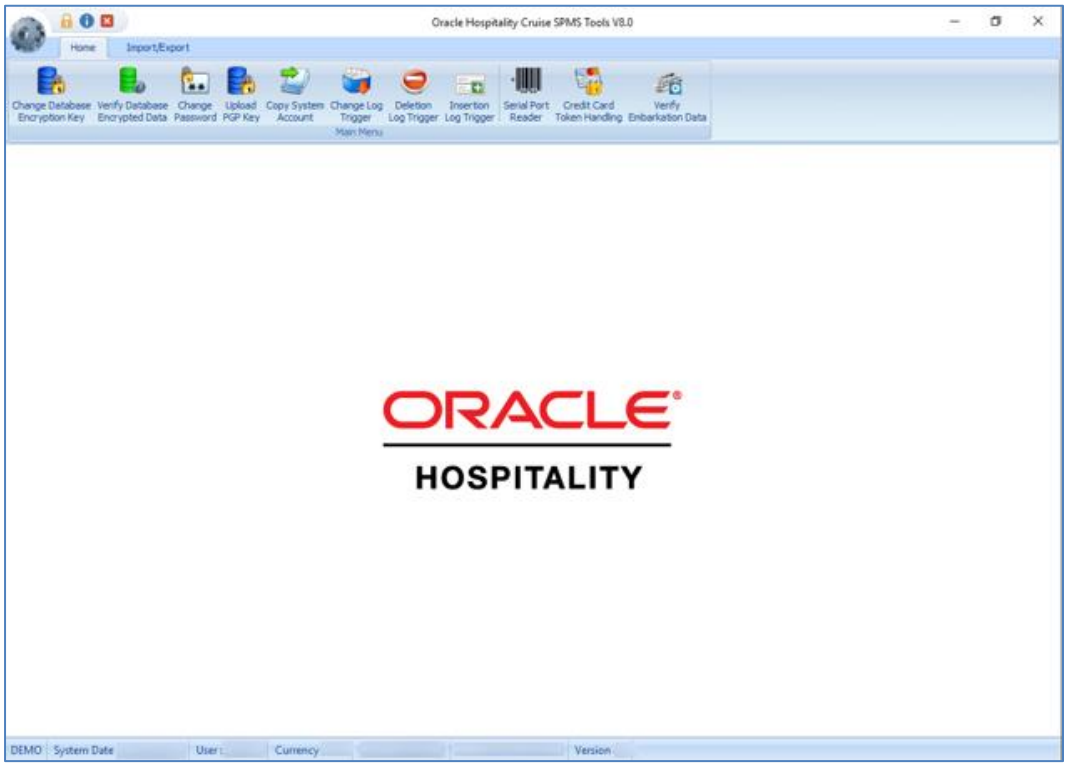


**Figure 4-3 - Tools Main Screen**

5. Click the **Change Database Encryption Key**. The Fidelio Encryption Key Manager screen pops up.
6. The key custodians will have to enter their part of the passphrase in the text boxes labeled **Passphrase 1** and **Passphrase 2**. They are required to confirm the input and the application will validate the passphrases.
7. Once the passphrase is entered and validated, another login to the database is required. The user needs to know the name of the Oracle connection and have a user ID and a password that grant necessary permissions to the targeted Oracle schema. See Figure 4-4.

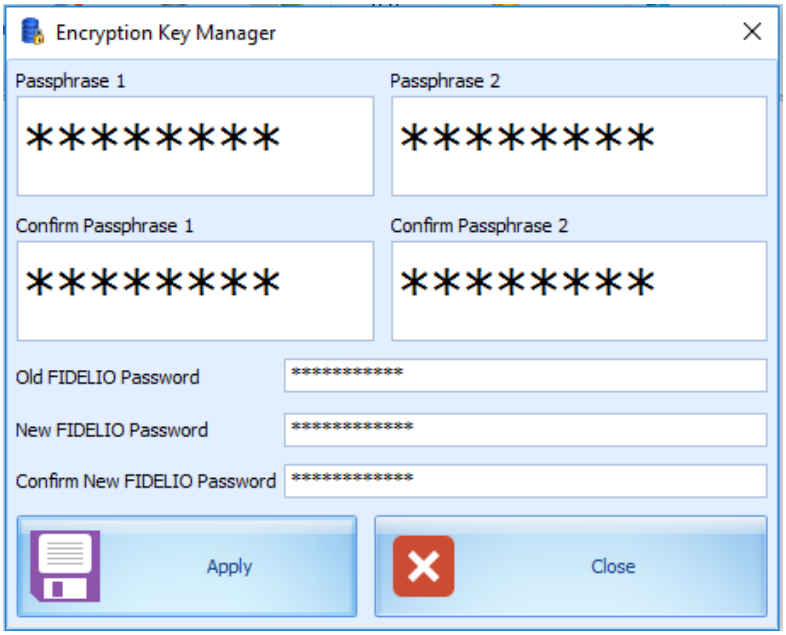


**Figure 4-4 - Encryption Key Manager**

8. Once all information is filled, click **Apply** and the system prompts a reminder pops-up, see Figure 4-5.

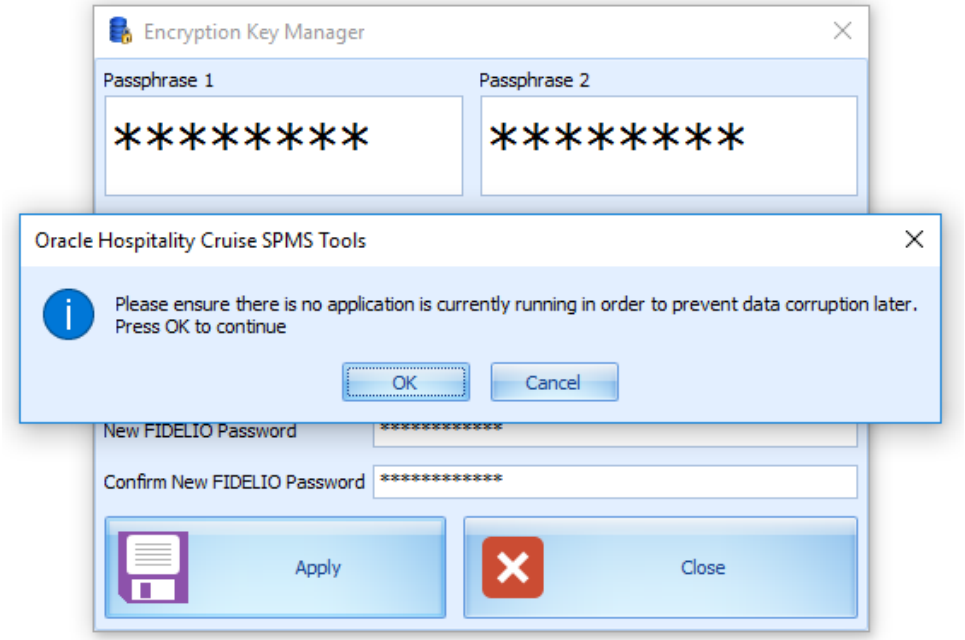


**Figure 4-5 - Encryption Key Manager Prompt**

9. During the rotation of the keys, all the database infrastructure is in place and the cardholder data information residing in the database will be unencrypted using the soon to be replaced DEK (old) and once the new DEK is in place the information will be encrypted using the new DEK. These processes take place in memory, and the newly encrypted cardholder data is written to the database. In Figure 4-6 you can see the screen of the application once the process is completed.

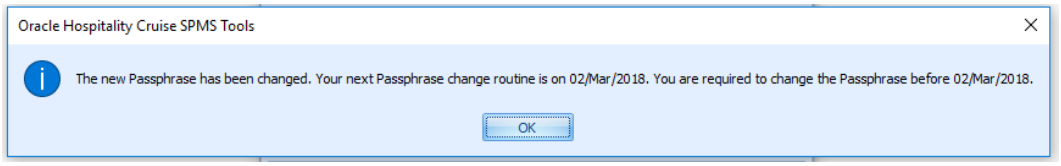


**Figure 4-6 - Encryption Completes Notification**

# Appendix A Inadvertent Capture of PAN

This appendix provides instructions for addressing the inadvertent capture of PAN on the following supported operating systems:

- Microsoft Windows 10
- Microsoft Windows 8.1
- Microsoft Windows 7

## Microsoft Windows 10

### Disable System Restore

1. Right-click **Computer** and select **Properties**.
2. On the System dialog box, click **Advanced system settings**.
3. On the **System Protection** tab, click **Configure**.
4. Select **Disable system protection**, click **Apply**, and then click **OK** until you return to the System dialog box.
5. Restart the computer.

### Encrypt PageFile.sys

Your hard disk must be formatted using NTFS to perform this operation.

1. Click the **Start** button and enter cmd.
2. Right-click **Command Prompt** and select **Run as Administrator**.
3. Enter the command: fsutil behavior set EncryptPagingFile 1
   To disable encryption, enter 0 instead of 1.
4. Enter the command: fsutil behavior query EncryptPagingFile
5. Verify that the command prompt returns: EncryptPagingFile = 1

### Clear the System PageFile.sys on Shutdown

You can enable the option to clear PageFile.sys on system shutdown to purge temporary data. This ensures that information such as system and application passwords and cardholder data is not inadvertently kept in the temporary files. Enabling this feature may increase the time it takes for system shutdown.

1. Click the **Start** button and enter Regedit.
2. Right-click Registry Editor and select **Run as Administrator**.
3. Navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\
4. Right-click ClearPageFileAtShutdown and select **Modify**.
   If ClearPageFileAtShutdown does not exist, right-click the Memory Management folder, select **New**, and select **DWORD (32-bit) Value**.
5. Set the **Value data** field to 1 and click **OK**.

### Disable System Management of PageFile.sys

1. Right-click on **My Computer** and select **Properties**.
2. On the System dialog box, click **Advanced system settings**.
3. On the **Advanced** tab, click **Settings** for Performance.
4. On the **Advanced** tab, click **Change**.

5. Deselect **Automatically manage page file size for all drives**, select **Custom size**, and set the following fields:
    a. **Initial Size:** the amount of Random Access Memory (RAM) available.
    b. **Maximum Size:** 2x the amount of RAM.
6. Click **OK** until you return to the System dialog box.
7. Restart the computer.

### Disable Error Reporting

1. Click the **Start** button and enter Control Panel**.**
2. Click **Control Panel** and then click **Security and Maintenance**.
3. Click **Maintenance** and then click **Check for solutions**.
4. Select **Never check for solutions**, then click **OK**.

## Microsoft Windows 8.1

### Disable System Restore

1. Right-click **My Computer** and select **Properties**.
2. At the System dialog box, click **Advanced system settings**.
3. On the **System Protection** tab, click **Configure**.
4. Select **Turn off system protection**, click **Apply**, and then click **OK** until you return to the System dialog box.
5. Restart the computer.

### Encrypt PageFile.sys

Your hard disk must be formatted using NTFS to perform this operation.

1. Click the **Start** button and enter cmd.
2. Right-click **Command Prompt** and select **Run as Administrator**.
3. Enter the command: fsutil behavior set EncryptPagingFile 1
   To disable encryption, enter 0 instead of 1.
4. Enter the command: fsutil behavior query EncryptPagingFile
5. Verify that the command prompt returns: EncryptPagingFile = 1

### Clear the System PageFile.sys on Shutdown

You can enable the option to clear PageFile.sys on system shutdown to purge temporary data. This ensures that information such as system and application passwords and cardholder data is not inadvertently kept in the temporary files. Enabling this feature may increase the time it takes for system shutdown.

1. Click the **Start** button and enter Regedit.
2. Right-click Registry Editor and select **Run as Administrator**.
3. Navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\
4. Right-click **ClearPageFileAtShutdown** and select **Modify**.
   If **ClearPageFileAtShutdown** does not exist, right-click the Memory Management folder, select **New**, and select **DWORD (32-bit) Value**.
5. Set the **Value data** field to 1 and click **OK**.

### Disable System Management of PageFile.sys

1. Right-click **My Computer** and select **Properties**.

2. On the System dialog box, click **Advanced system settings**.
3. On the **Advanced** tab, click **Settings** for Performance.
4. On the **Advanced** tab, click **Change**.
5. Deselect **Automatically manage page file size for all drives**, select **Custom size**, and set the following fields:
    a. **Initial Size:** the amount of Random Access Memory (RAM) available.
    b. **Maximum Size:** 2x the amount of RAM.
6. Click **OK** until you return to the System dialog box.
7. Restart the computer.

### Disable Error Reporting

1. Click the **Start** button and enter Control Panel.
2. Click **Control Panel** and then click **Action Center**.
3. Click **Change Action Center settings**, then click **Problem reporting settings**.
4. Select **Never check for solutions**, then click **OK**.

## Microsoft Windows 7

### Disable System Restore

1. Right-click **My Computer** and select **Properties**.
2. On the System dialog box, click **Advanced system settings**.
3. On the **System Protection** tab, click **Configure**.
4. Select **Turn off system protection**, click **Apply**, and then click **OK** until you return to the System dialog box.
5. Restart the computer.

### Encrypt PageFile.sys

Your hard disk must be formatted using NTFS to perform this operation.

1. Click the **Start** button and enter 'cmd' in the search field.
2. Right-click cmd.exe and select **Run as Administrator**.
3. Enter the command: fsutil behavior set EncryptPagingFile 1
   To disable encryption, enter 0 instead of 1.
4. Enter the command: fsutil behavior query EncryptPagingFile
5. Verify that the command prompt returns: EncryptPagingFile = 1

### Clear the System PageFile.sys on Shutdown

You can enable the option to clear the PageFile.sys on system shutdown to purge the temporary data. This is to ensure that information such as system and application passwords and cardholder data is not inadvertently kept in the temporary files. Enabling this feature may increase the time it takes for system shutdown.

1. Click the **Start** button and enter Regedit in the search field.
2. Right-click regedit.exe and select **Run as Administrator**.
3. Navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\
4. Right-click **ClearPageFileAtShutdown** and select **Modify**.
   If ClearPageFileAtShutdown does not exist, right-click the Memory Management folder, select **New**, and select **DWORD (32-bit) Value**.
5. Set the **Value data** field to 1 and click **OK**.

## Disable System Management of PageFile.sys

1. Right-click **My Computer** and select **Properties**.
2. On the System dialog box, click **Advanced system settings**.
3. On the **Advanced** tab, click **Settings** for Performance.
4. On the **Advanced** tab, click **Change**.
5. Deselect **Automatically manage page file size for all drives**, select **Custom size**, and set the following fields:
    a. **Initial Size:** the amount of Random Access Memory (RAM) available.
    b. **Maximum Size:** 2x the amount of RAM.
6. Click **OK** until you return to the System dialog box.
7. Restart the computer.

## Disable Error Reporting

1. Click the **Start** button, select **Control Panel**, and then click **Action Center**.
2. Click **Change Action Center settings**, then click **Problem reporting settings**.
3. Select **Never check for solutions**, then click **OK**