INTEGRIGY

Credit Cards and Oracle E-Business Suite
Security and PCI Compliance Issues

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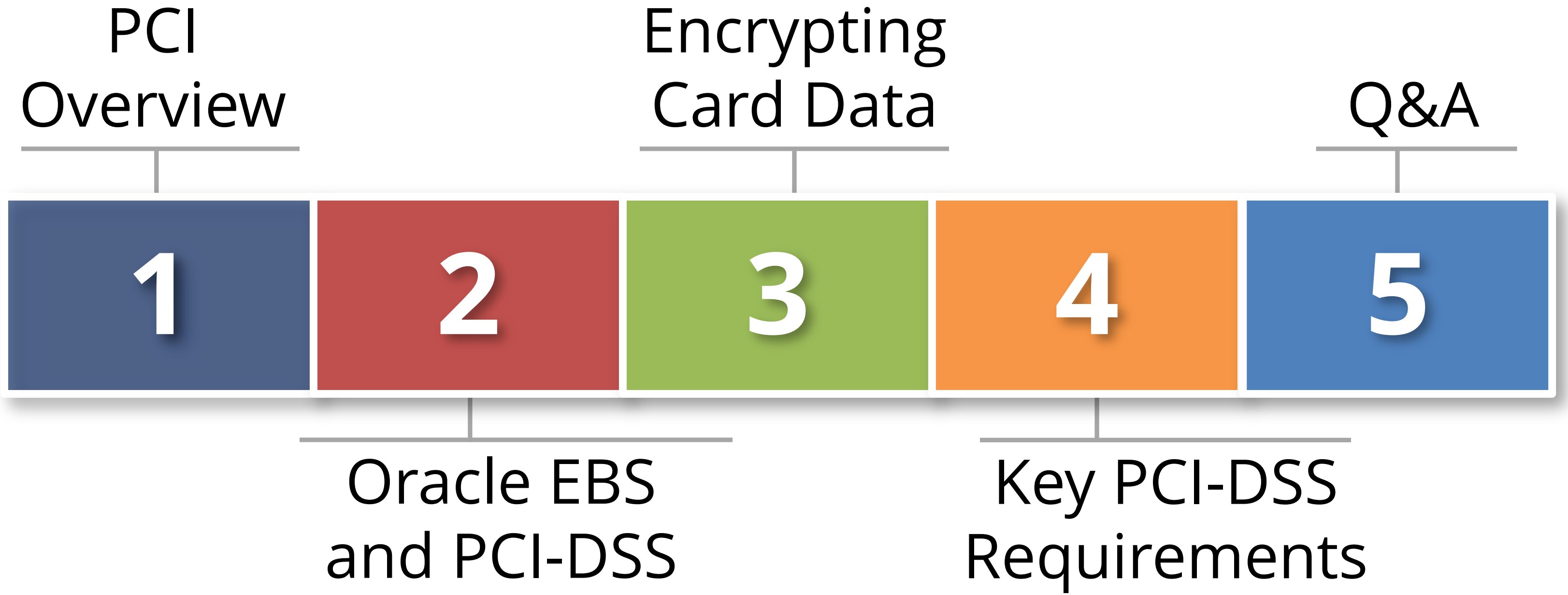
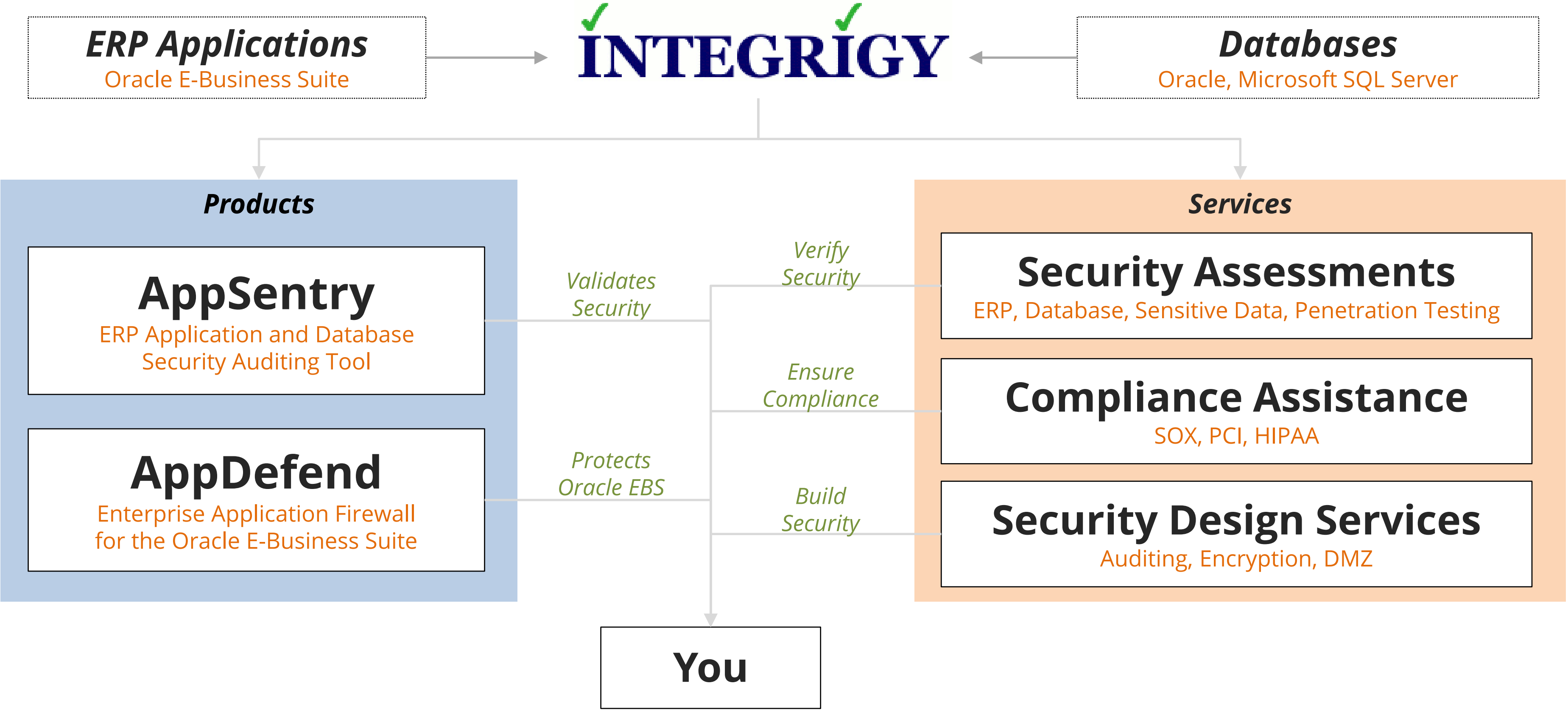
Agenda



1. PCI Overview
2. Oracle EBS and PCI-DSS
3. Encrypting Card Data
4. Key PCI-DSS Requirements
5. Q&A

About Integrigy



ERP Applications
Oracle E-Business Suite

INTEGRIGY

Databases
Oracle, Microsoft SQL Server

Products

AppSentry
ERP Application and Database Security Auditing Tool

AppDefend
Enterprise Application Firewall for the Oracle E-Business Suite

Services

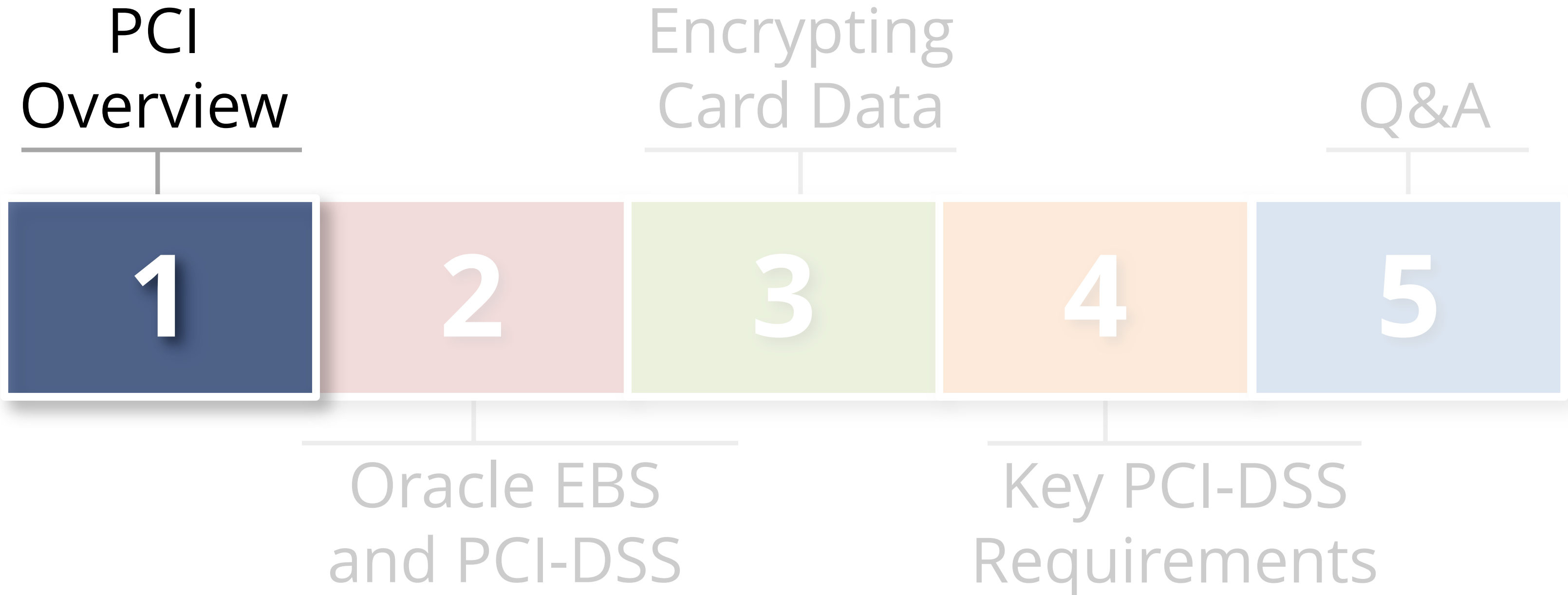
Security Assessments
ERP, Database, Sensitive Data, Penetration Testing

Compliance Assistance
SOX, PCI, HIPAA

Security Design Services
Auditing, Encryption, DMZ

You

Agenda



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Payment Card Industry (PCI)

- **PCI Security Standards Council** is a single organization that consolidated the multiple credit card security programs
  - American Express, Discover, JCB, MasterCard, Visa

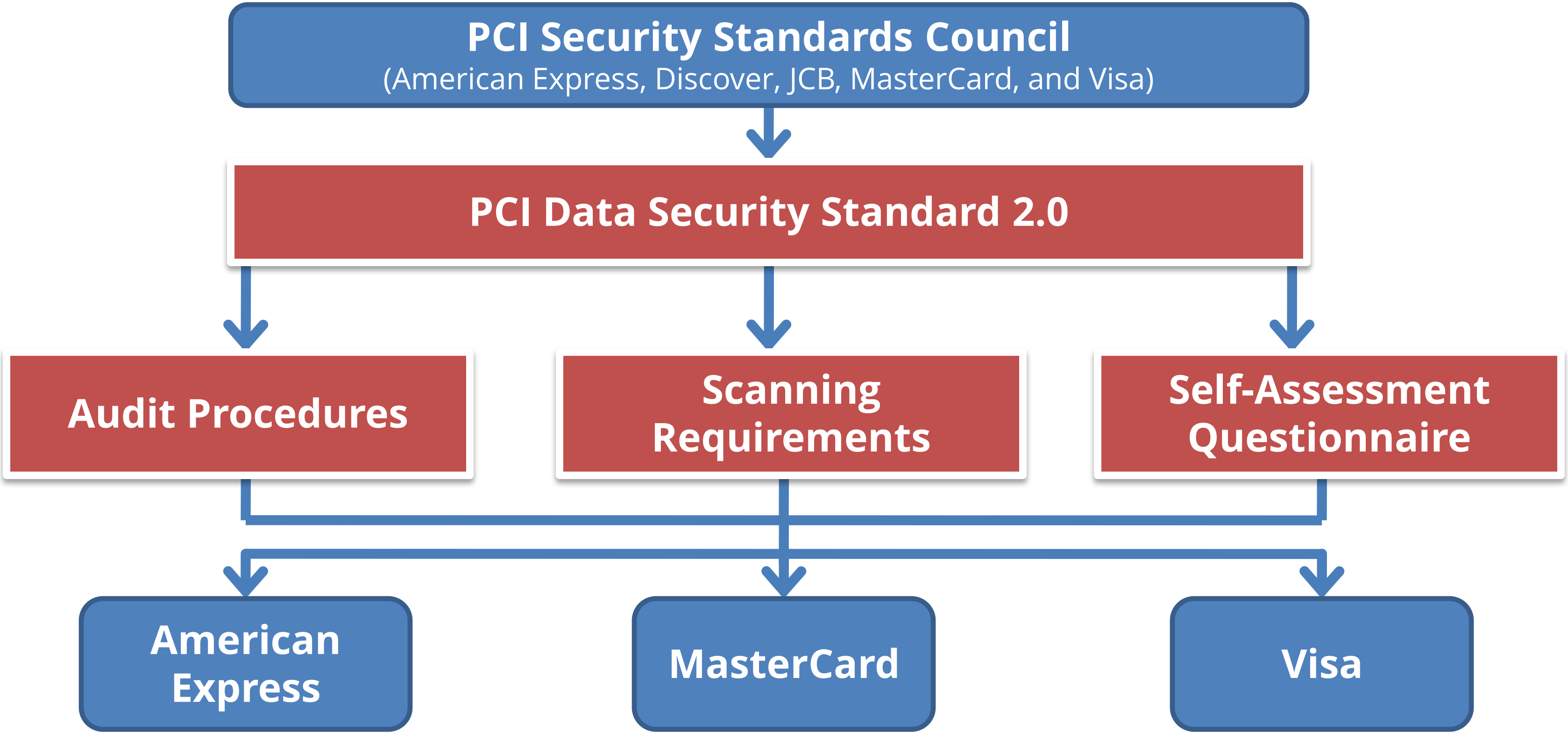
- Publishes "**Data Security Standard (DSS)**" and related documents

- Manages third-party "Qualified Security Assessors (QSA)" and "Approved Scanning Vendors (ASV)"

PCI Data Security Standard 2.0

- A set of **12 stringent security requirements** for networks, network devices, servers, and applications
  - 200 sub-requirements
- Specific requirements in terms of security configuration and policies and all the requirements are mandatory
- Focused on securing credit card data
- **Significant emphasis on general IT security and controls**

PCI DSS Structure



PCI Security Standards Council
(American Express, Discover, JCB, MasterCard, and Visa)

PCI Data Security Standard 2.0

Audit Procedures

Scanning Requirements

Self-Assessment Questionnaire

American Express

MasterCard

Visa

PCI Compliance

- **Compliance is dependent on card brand, merchant type (ecommerce), and transactions**
  - On-site assessment
  - Quarterly external scans
  - Self-assessment questionnaire (through Acquirer)
  - Depending on card brand, may be required to submit documentation
- **In case of a data breach, compliance is assessed by team of forensic auditors**
  - Audit result determines liability

PCI Compliance Levels

Transactions per Year	Level	Compliance Requirement
6,000,000+	**1**	▪ Annual on-site security assessment ▪ Quarterly Internet-facing network scan
1,000,000 to 6,000,000	**2**	▪ Annual PCI self-assessment ▪ Quarterly Internet-facing network scan
20,000 to 1,000,000 e-Commerce (only)	**3**	▪ Annual PCI self-assessment ▪ Quarterly Internet-facing network scan
< 20,000 e-Commerce < 1,000,000 Total	**4**	▪ Annual PCI self-assessment

Exact transaction per year requirements vary by card brand (VISA, MasterCard, American Express)

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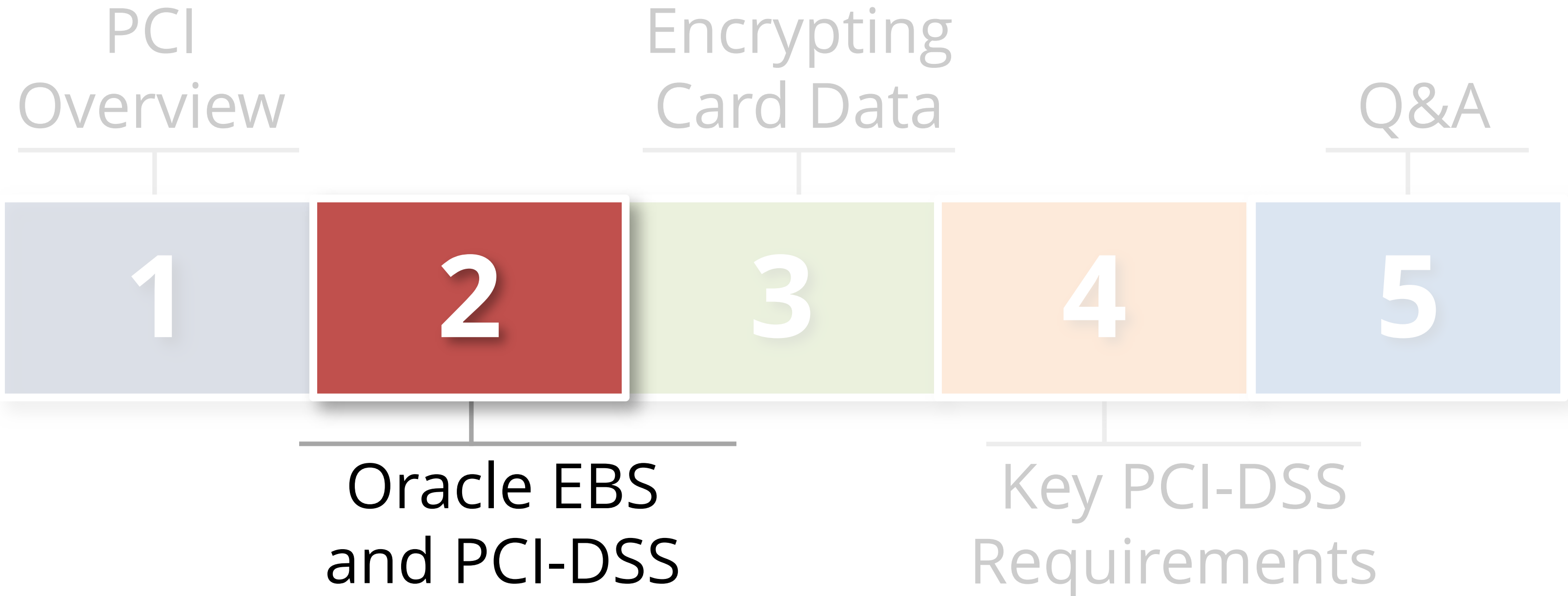

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All Oracle E-Business Suite environments that **"store, process, or transmit cardholder data"** must comply with the Data Security Standard 2.0 (PCI-DSS) regardless of size or transaction volume.

PCI-DSS 2.0 Mapping

#	Requirement	Network	Server	Database	Oracle EBS	Policy
1	Use Firewall to protect data	✓				✓
2	Do not use vendor-supplied defaults	✓	✓	✓	✓	✓
3	Protect stored cardholder data		✓	✓	✓	✓
4	Encrypt data across open, public networks	✓				
5	Use Anti-virus software		✓			✓
6	Develop and maintain secure applications	✓	✓	✓	✓	✓
7	Restrict access to cardholder data		✓	✓	✓	✓
8	Assigned unique IDs for access		✓	✓	✓	✓
9	Restrict physical access to data	✓	✓			✓
10	Track and monitor access	✓	✓	✓	✓	✓
11	Regularly test security	✓	✓	✓	✓	✓
12	Maintain information security policy					✓

PCI-DSS 2.0 – Compliance Effort

#	Requirement	OS/Network	Oracle DB	Oracle EBS
1	Use Firewall to protect data	🟨 1		
2	Do not use vendor-supplied defaults	🟧 3	🟧 3	🟧 2
3	Protect stored cardholder data			🟥 6
4	Encrypt data across open, public networks	🟨 1		
5	Use Anti-virus software	🟨 1		
6	Develop and maintain secure applications	🟨 1	🟥 3	🟥 5
7	Restrict access to cardholder data		🟥 2	🟨 2
8	Assigned unique IDs for access	🟧 3	🟥 4	🟧 4
9	Restrict physical access to data			
10	Track and monitor access	🟧 7	🟥 6	🟥 6
11	Regularly test security	🟨 2	🟨 1	🟨 1
12	Maintain information security policy			

🟥 High 🟧 Medium 🟨 Low

Credit Cards and Oracle E-Business Suite

- Standard installation is **NOT COMPLIANT**

- Storage of credit card data is by module
- Card number stored un-encrypted
- Masking of card numbers controlled by module specific profile options
- iPayment is payment gateway
  - Oracle Payments in R12

PCI Definition of Bad Things to Do

1. Storage of CVV/CV2 or magnetic strip data
   - Not normally stored in Oracle E-Business Suite
   - CVV/CV2 is 3 digits on back of card or 4 digits above number on front of card
2. Storage of card number (PAN) **unencrypted**
3. Weak “General IT Controls”
   - IT processes such as passwords, patching, change management, and development

PCI PA-DSS

- **Oracle PA-DSS Consolidated Patch for 12.1**
  - Reduces complexity of PCI DSS compliance
  - Fixes multiple functional weaknesses when processing and viewing credit card data
  - Does not eliminate significant manual configuration for PCI DSS
  - Only 12.1 is PA-DSS compliant – Not yet on approved list
  - See Metalink Note ID 984283.1
- **11i and 12.0 will not be PA-DSS compliant**
  - See Metalink Note ID 1101213.1

PCI-DSS Prioritized Approach (1-6)

1 – Do not store prohibited data

2 – Secure configuration

3 – Web application firewall

3 – Security patching

4 – Access Control

4 – Logging and monitoring

5 – Encrypt credit card data

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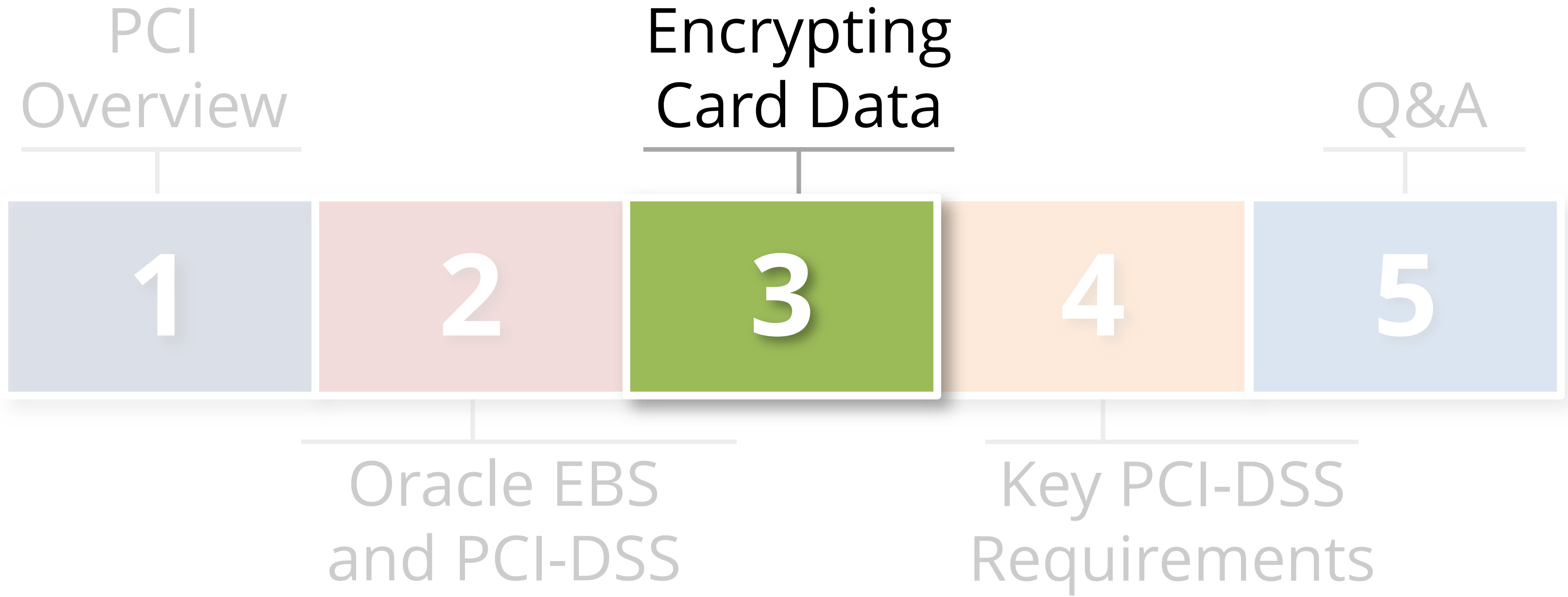

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Credit Card Number Encryption

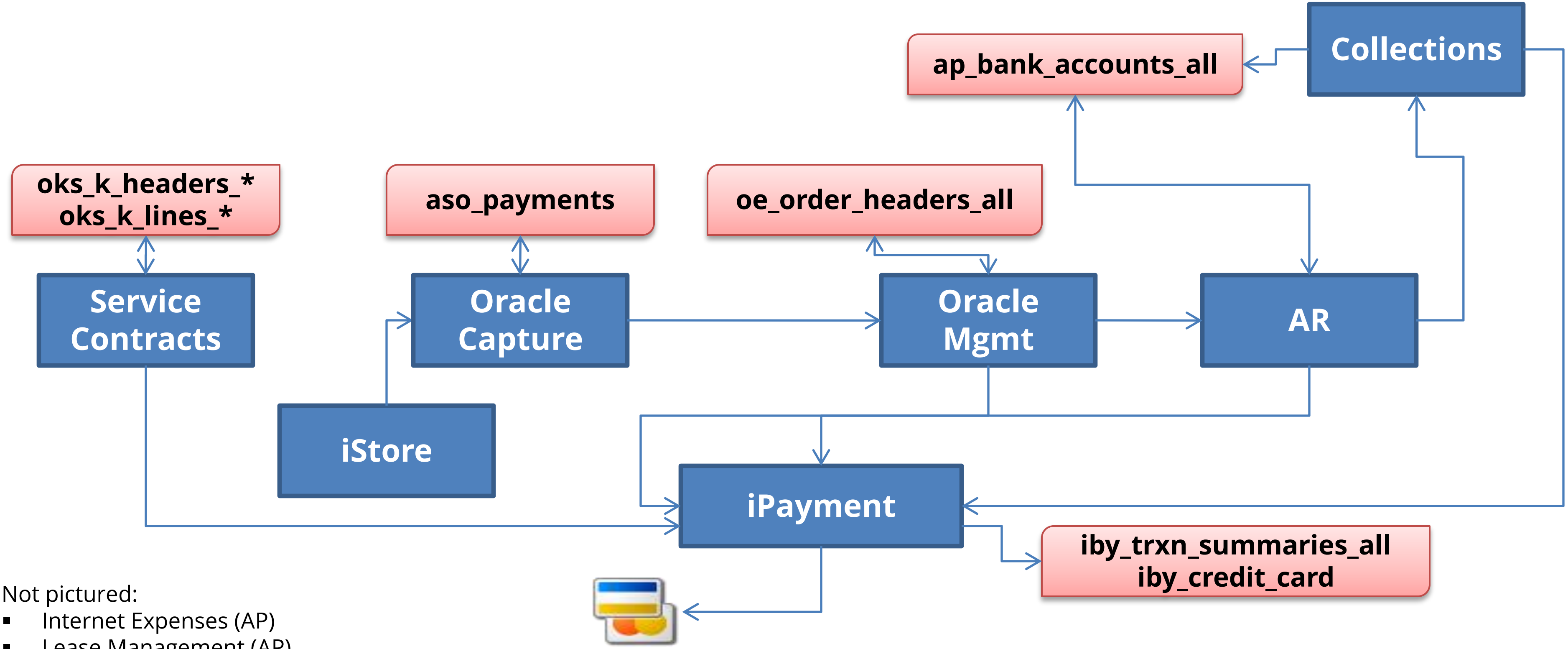
- **Use the Oracle E-Business Suite encryption**
  - Application-level encryption
  - Better solution than other technologies such as Oracle Transparent Data Encryption (TDE)

- **Metalink Note ID 338756.1, Patch 4607647**
  - Consolidates card numbers into IBY_SECURITY_SEGMENTS table
  - Encrypts card numbers in IBY_SECURITY_SEGMENTS
  - Uniform masking of card numbers
  - Significant functional pre-requisites (11.5.10.2)

Oracle Credit Card Encryption Solution

- **Implementation of “FND Vault” for secure data storage**
  - Key chain used (FND Vault Key -> Application Generated Key -> Data)
- **Consolidation of credit card numbers into a single table**
- **All access to credit card number replaced with one of the following –**
  1. Package to decrypt/encrypt card number
  2. Hashes used for searching/matching card numbers

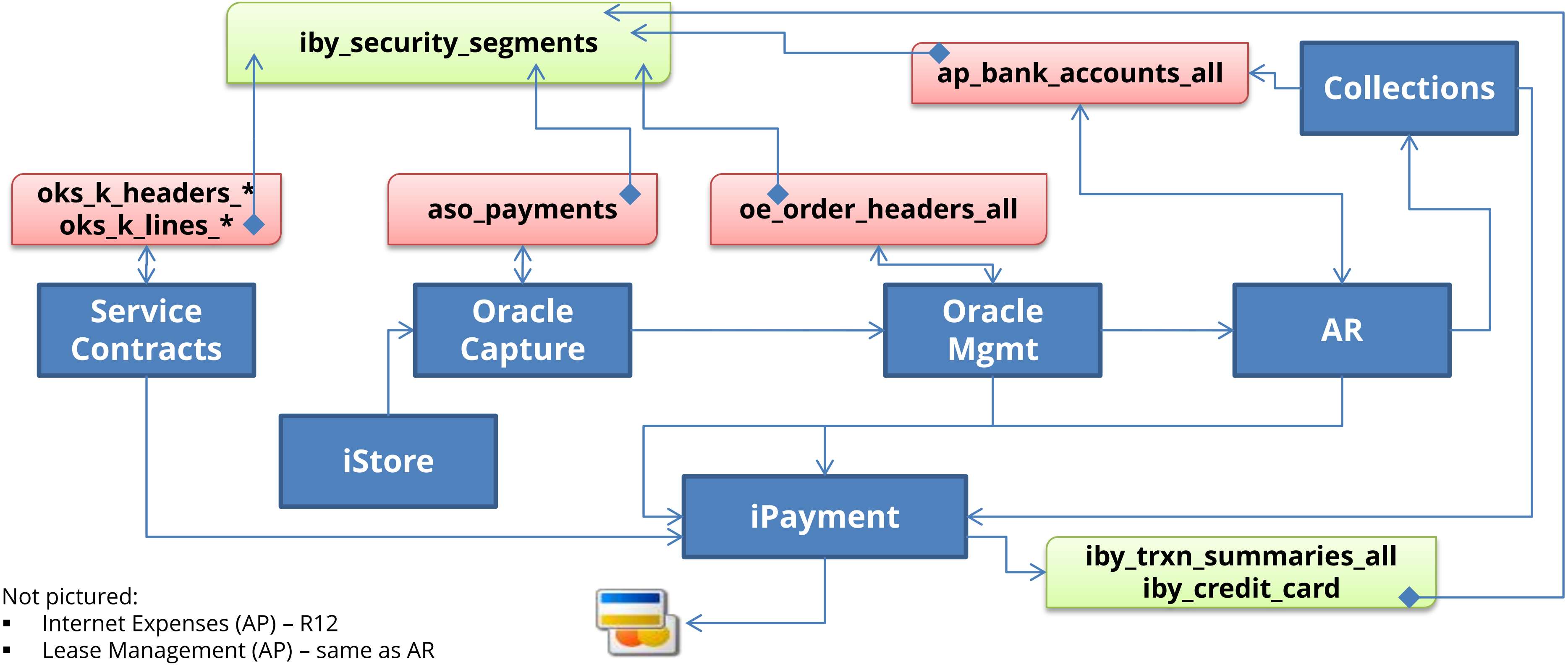
Oracle E-Business Suite and Credit Cards



Not pictured:

- Internet Expenses (AP)
- Lease Management (AP)
- Student System (IGS)

Credit Card Encryption Patch



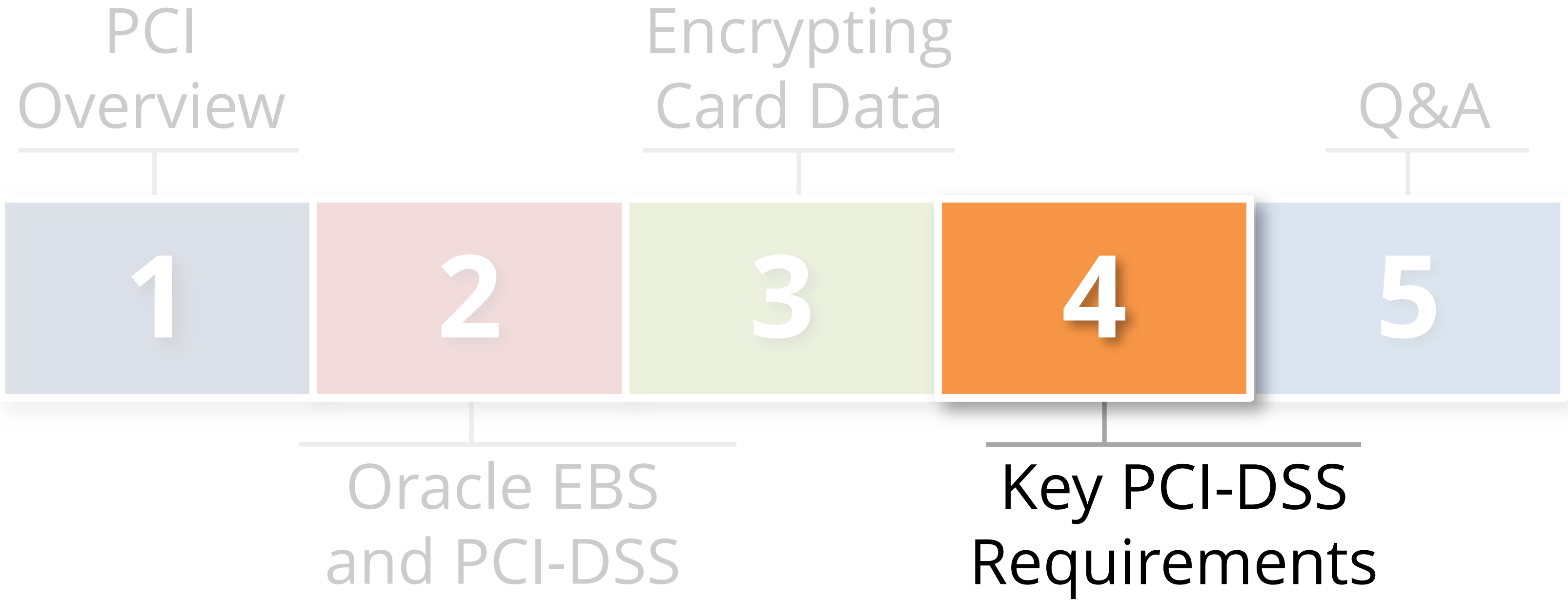
Not pictured:

- Internet Expenses (AP) – R12
- Lease Management (AP) – same as AR
- Student System (IGS) – IGS patch

Where else might be Sensitive Data?

- **Custom tables**
  - Customizations may be used to store or process sensitive data
- **“Maintenance tables”**
  - DBA copies tables to make backup prior to direct SQL update
  - iby.iby_security_segments_011510
- **Interface tables**
  - Credit card numbers are often accepted in external applications and sent to Oracle EBS
- **Interface files**
  - Flat files used for interfaces or batch processing
- **Log files**
  - Log files generated by the application (e.g., iPayment)
- **Oracle EBS Flexfields**
  - It happens – very hard to find

Agenda



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2. Do not use vendor-supplied defaults

- **Change all default settings**
  - Default database passwords
  - Default seeded application passwords
- **A configuration standard is required**
  - Use Oracle's Secure Configuration Guide for Oracle EBS
- **All administrator network traffic must be encrypted, consequently, all network traffic must be encrypted**
  - SSL, SSH, SQL*Net encryption

3. Protect stored cardholder data

- **Must find ALL locations of credit card data**
- **Storing of card data in logs is a major issue**
  - Look at other log files such as Apache or reporting
- **Review existing data archiving and purging**
  - Credit card data retention should be less than 18 months
  - No Oracle supported purging available
  - Custom solution required
  - Do not mean entire transaction, just card number
- **Must scramble card data in development and test**
  - Even if encrypted or hashed, must be scrambled
  - No Oracle supported scrambling available

6.1 Develop and maintain secure apps

- **Oracle Critical Patch Updates (CPU) should be applied within 30 days!**

"6.1 Ensure that all system components and software are protected from known vulnerabilities by having the latest vendor-supplied security patches installed. Install critical security patches within one month of release."

6.6 Protect Internet-facing Applications

- **iSupplier, iStore, iSupport, etc. must be protected by one of the following -**
  - Annual penetration tests
  - Web application firewall (WAF)
- **Significant cost to deploy WAF just for Oracle EBS**
  - Existing WAF not optimized for Oracle EBS and not specific rules
  - WAF rules must be developed for Oracle EBS
- **Integrigy AppDefend WAF**
  - WAF highly optimized for Oracle EBS
  - Satisfies PCI-DSS 6.6 requirements
  - Provides support for application logging requirements (10.x)

8. Assign unique IDs for access

- **No generic accounts or all usage must be tied to an individual**
  - How to handle SYS, SYSTEM, …?
  - No generic accounts for read-only
  - Generic management accounts must be controlled
- **Strong password controls must be implemented for database and application**
  - Need to use database profiles to enforce database passwords
  - Must have a custom password validation function
  - Length => 7, password complexity, expire every 90 days, no reuse > 450 days, failure limit <= 6
- **Session time-out = 15 minutes**

10. Track and monitor access

- **PCI has strong focus on logging, auditing, and monitoring**
    - Need to have logs and audit trails to forensically determine what happened in case of an incident
    - Daily review of critical logs required
- **Auditing and logging is problematic for Oracle EBS due to the design and complexity**
    - Use of the generic, privileged accounts (APPS, SYS, etc.)
    - DBA can manipulate the audit trail
    - High volume of audit data with limited value
    - Many key audit fields can be spoofed

10. Track and monitor access

10.1 Establish a process for linking all access to system components to each individual user (especially access done with administrative privileges)

- ***oracle/applmgr, APPS, SYS, SYSTEM, generic application accounts***

10.2 Audit Trails

- All individual accesses to cardholder data – ***Performance!!!***
- All actions taken by any individual with root or administrative privileges – ***SYS, APPS***
- Access to all audit trails
- Invalid logical access attempts
- Use of identification and authentication mechanisms
- Initialization of audit logs
- Creation and deletion of system-level objects

10.5 Secure audit trails so they cannot be altered

- ***SYS.AUD$ - no DBA access***

10.7 Retain audit trail history for at least one year

Database Audits and Estimated Volumes

Audit	PCI #	Description	Daily Volume
Session	10.2.1 10.2.4 10.2.5	Connections to the database including failed logins (ora-1017)	10,000+
User	10.2.2	Creation, altering, and dropping of database user accounts	0
System audit	10.2.3	Changes to the database auditing	0
System grant	10.2.2	Grants to system privileges and roles, does not include object grants	0
Create role, alter any role, drop any role	10.2.2	Creation, altering, and dropping of database roles, does not include SET ROLE	0
Profile	6.X	Creation, altering, or dropping of database profiles used for password controls	0
Public database link		Creation, altering, or dropping of public database links, which should not be used	0
Database link		Creation, altering, or dropping of database links	0
Sysdba, sysoper	10.2.2 10.2.6	Actions taken by DBAs	100+

11. Regularly test security

- **Periodic penetration tests should be performed annually, especially for Internet-facing applications**

- **“Deploy file integrity monitoring software”**
  - A standard Oracle EBS install has 500,000+ files
  - Multiple configuration files and logs can make deploying file integrity monitoring challenging
  - R12 $INST_TOP improves monitoring situation

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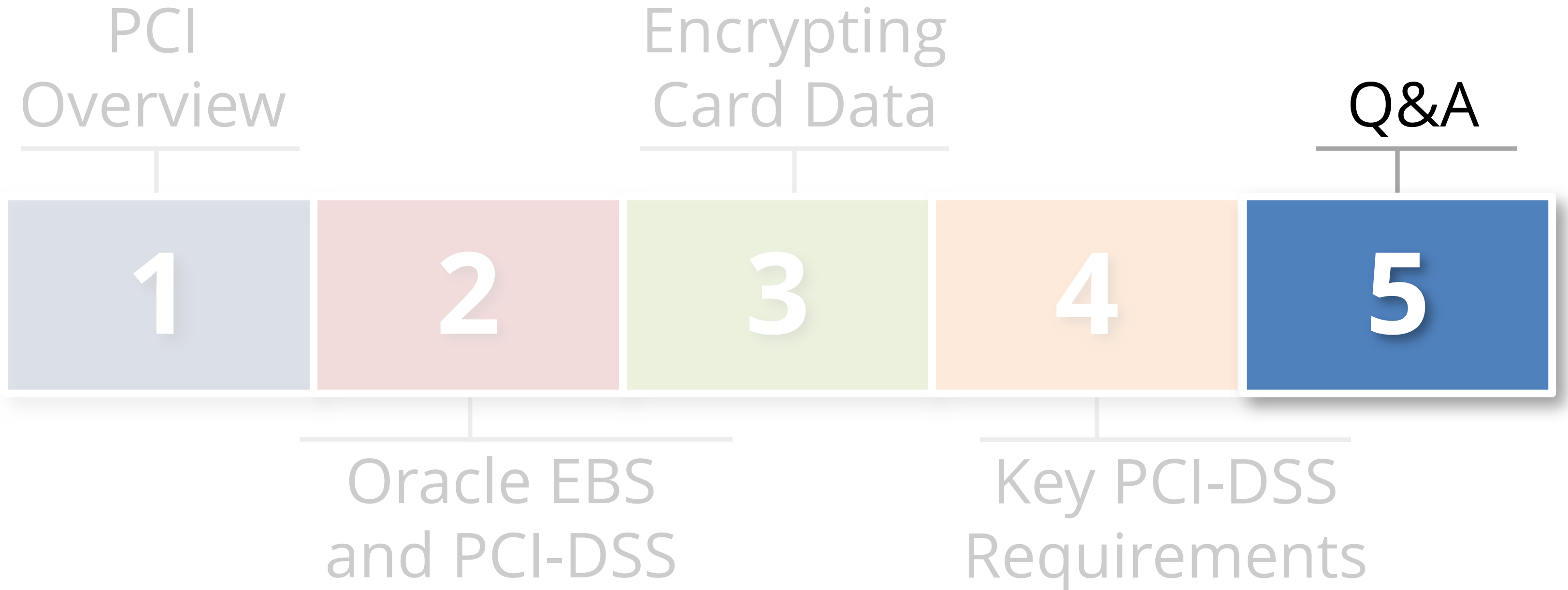

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