NIST Computer Security Division Update

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Agenda

- Organizational Update
- FIPS 140-3 Update
- Hash Competition Update
- Secure Web Services Guide Discussion
- New Publications

Organizational Update

- Chief Cyber Security Advisor – W. Curt Barker
- Cyber Security – Tim Grance
- Identity Management System – James Dray
- Trustworthy Network – Tom Karygianis

FIPS 140-2 and FIPS 140-3

FIPS 140-2

- Cryptographic Module Specification
- Cryptographic Module Ports and Interfaces
- Roles, Services, and Authentication
- Finite State Model
- Physical Security
- Operational Environment
- Cryptographic Key Management
- EMI/EMC
- Self Tests
- Design Assurance
- Mitigation of Other Attacks

FIPS 140-3

- Cryptographic Module Specification
- Cryptographic Module Ports and Interfaces
- Roles, Authentication and Services
- Software Security
- Operational Environment
- Physical Security – Invasive
- Physical Security – Non-Invasive
- Sensitive Security Parameter (SSP) Management
- Self Tests
- Life-Cycle Assurance
- Mitigation of Other Attacks

Slide content is subject to change

FIPS 140-3: Highlights

- New Security Level 5
- Non-Invasive Attacks
- Software Security Section
- Life-Cycle Assurance
- EFP at Level 5
- Detached from CC
- SSPs, CSPs and PSPs
- Key Management Clarified
- Pre-operational tests

Slide content is subject to change

FIPS 140-3 Schedule

01/12/2005	Federal Register Notice Announcement Announcing Development of FIPS 140-3
02/28/2005	Comments received on FIPS 140-2
09/26/2005	Physical Security Workshop
03/31/2007	First Public Draft of FIPS 140-3 – Internal Review and Approval
07/13/2007	First Public Draft of FIPS 140-3 Released
10/11/2007	First Public Draft comment period ends
2008	Public Workshop
2008	Second Public Draft of FIPS 140-3 Released
2008	Second Public Draft comment period ends
2008	Final Release of FIPS 140-3
2008	Signed by the Secretary of the Department of Commerce
+6 Months	FIPS 140-3 Effective
+6 Months	Transition from FIPS 140-2 to FIPS 140-3 ends

SHA-3 Hash Function Competition

- Motivated by collision attacks on most of the commonly used hash algorithms, particularly MD5 & SHA-1
  - No actual collisions yet announced on SHA-1
- Held 2 hash function workshops
- Jan 2007 proposed criteria for new hash function comment period
- Many comments received
- Announcement for “SHA-3” Competition Nov. 2, 2007

Minimum Acceptability Requirements

- Publically disclosed and available worldwide without royalties or inetellectual property restrictions
- Algorithm implementable in a wide range of hardware and software
- Support message digest sizes 224, 256,384, and 512 bits
- Support maximum message length of at least 2 $^{64-1}$ bits

Evaluation Criteria

- Security
- Cost
  - Computational Efficiency
  - Memory Requirements
- Flexibility
- Simplicity

Submission Package

- Name of submitters
- Algorithm Specification
- Supporting Documentation
- Known Answer Tests
- Reference Implementation
- Statement by Patent Owner (if applicable)

SHA-3 Competition Timeline

- 1Q07 draft submission criteria published
- 11/2/07 Federal Register Announcement
- 8/31/08 Preliminary submissions:
  - NIST will review for completeness by 9/30/08
- 10/31/08 Final submissions due
- 2Q09 First Candidate Conference
- 2Q10 Second Candidate Conference
- 3Q10 Announce Finalist Candidates
- 4Q10 Final Tweaks of Candidates
- 1Q12 Last Candidate Conference
- 2Q12 Announce Winner
- 4Q 12 FIPS package to Secretary of Commerce

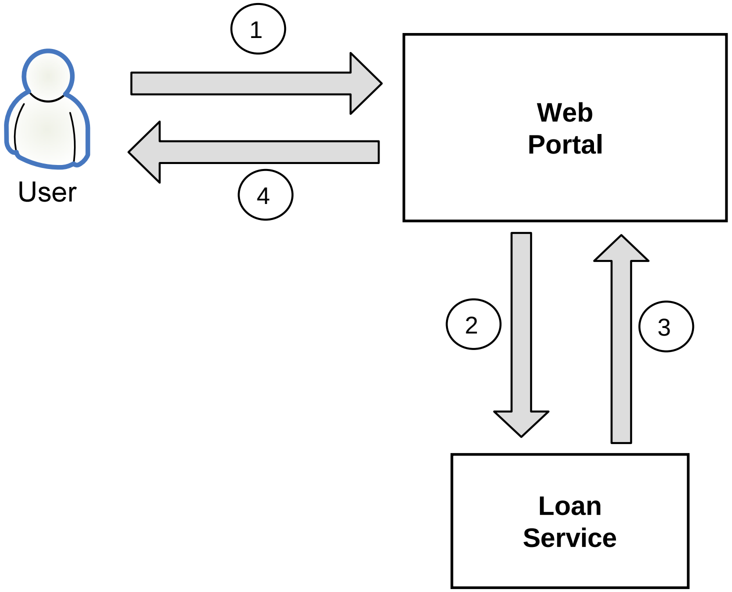
NIST Hash Function Policy

- Federal Users may use SHA-2 family hash functions (SHA-224, SHA-256, SHA-384, & SHA-512) for all hash function applications.
- For digital signatures and other apps that require collision resistance, Federal users:
  - Should convert to SHA-2 as soon as practical, but
  - Must stop using SHA-1 for these apps by end of 2010
- Federal users may use SHA-1 after 2010 for:
  - HMAC
  - Key derivation
  - Random number generation
  - To verify old signatures (signed before 2011)

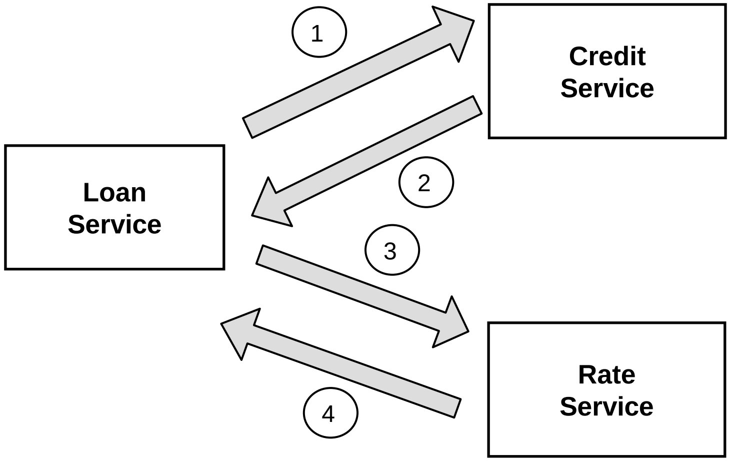
Guide to Secure Web Services

- Web Services and their Relation to Security
- Dimensions for Secure Web Services
- Web Services Security Standards
- Challenges for Secure Web Services
- Recommendations
- Conclusions

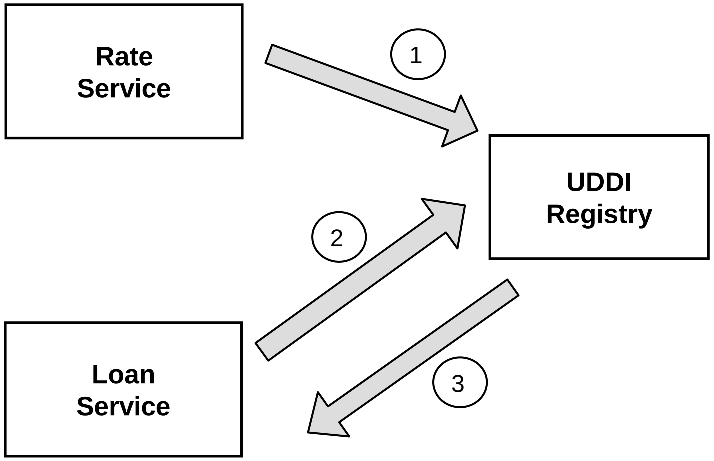
Web Service Example



Web Service Example (Cont)



Web Service Example (Cont)



Advantages of Web Services

- Web services provide interoperability between various software applications running on various platforms.
  - “vendor, platform, and language neutral”
- Web services leverage open standards and protocols. Protocols and data formats are text based where possible
  - Easy for developers to understand what is going on.
- By piggybacking on HTTP, web services can work through many common firewall security measures without requiring changes to their filtering rules.

Threat Facing Web Services

- Message Alteration:

  The message information is altered by modifying the information.
- Loss of Confidentiality:

  Information in the message can be viewed by unintended participants.
- Falsified Messages:

  Fake messages are constructed and sent to the receiver.
- Man in the middle:

  A party poses as the other participant to the real sender and receiver in order to fool both participants.

Threats (Cont)

- Principal Spoofing:

  A message is sent which appears to be from another principal.
- Forged Claims: A message is sent in which the security claims are forged to gain access to otherwise unauthorized information
- Replay of Message Parts:

  A message is sent which includes portions of another message in an effort to gain access to otherwise unauthorized information
- Denial of Service:

  An attackers forces the service to exhaust its resources

Security Services

- Authorization
- Integrity
- Non-repudiation
- Confidentiality
- Authentication
- Availability

Web Service Security Functions

- Service to Service Authentication
- Identity Management
- Establishing Trust between Services
- Authorization and Access Management
- Confidentiality and Integrity of Service to Service Interchange
- Accountability End-to End throughout a Service Chain
- Availability of Web services
- Security The Discovery Service

Web Security Services

Dimension	Requirement	Specifications
Messaging	Confidentiality and Integrity	WS-Security (XML DSig/Enc)
		SSL/TLS (HTTPS)
	Authentication	WS-Security (SAML, X.509)
		SSL/TLS (X.509)
Resource	Authorization	XACML
		XrML
		RBAC
	Privacy	EPAL
		XACML
	Accountability	Auditing
Discovery	Registries	UDDI
		ebXML

Secure Implementation Tools and Technologies

- Web Services Developer Toolkits
- XML Parsers
- Languages for Secure Web Service Development
- Security Testing Tools and Techniques

Some Publications in Development

- Draft Special Publication 800-53, Revision 2, Recommended Security Controls for Federal Information Systems Special Update
- NIST Special Publication 800-38D Recommendation for Block Cipher Modes of Operation: Galois/Counter Mode (GCM) and GMAC
- Draft Special Publication 800-39, Managing Risk from Information Systems: An Organizational Perspective
- Draft NIST Special Publication 800-73-2, Interfaces for Personal Identity Verification
- Draft NIST Interagency Report 7328, Security Assessment Provider Requirements and Customer Responsibilities: Building a Security Assessment Credentialing Program for Federal Information System
- Draft SP 800-61 Revision 1, Computer Security Incident Handling Guide