Internet Messaging as a Family of Web Services

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Motivation and Basic Idea

- Drawbacks of current Internet electronic mail:
  - Flexibility
  - Security
  - Integration

- Approach: Construct a Unified Messaging System based on Web Service Infrastructure
  - Standardized and Extensible
  - Widely adopted
  - Full-blown security specifications

Architecture

Distributed Components and Messages

- SD: Sender Domain
- SC: Sender Client
- SS: Sender Server
- RC: Receiver Client
- RS: Receiver Server
- RD: Receiver Domain
- SS/RS work as a web service.
- SC makes a web service call on its SS.
- SS makes a web service call on RS to deliver the mail from the SD into RD.
- RC periodically makes calls to RC to find new messages, retrieve message heads or download message bodies.
- Security is based on standard suites for web service security.
- Communications between the nodes can be protected by TLS.
- SC/RC are typically authenticated by password; SS/RS authenticate themselves by certificates.

On-Demand Attachments

- Web server deals with receiving and distributing mails to both clients and other servers.
- Database server stores messages for the web server.
- DNS server publishes SRV records so that remote WSEmail servers can locate each other.

Delivery of the message is intercepted by the instant messaging plug-in on the server and ultimately sent to the client through different means. Being a plug-in, a server admin can customize how instant messages are to be handled.

Routed Forms

- Routed forms and distributed workflow systems could easily allow multiple enterprises to work together, even though their networks are not completely open and trusted by each other.

Achievements

- Security: supports integrity, authentication and access control for both end-to-end and hop-by-hop message transmissions using web service security features.
- Extensibility: integrates different messaging systems such as the usual email SMTP-style messages.
- Flexibility: collection of messaging services that can be added to the SOAP services.
- A unified messaging platform for new applications.

Future Work

- Policy based puzzle anti-spam
- Ingress and egress policy enforcement on mail servers
- Policy advertisement and negotiation
- Secure workflow
- Other research prototype project...
Motivation

• Drawbacks of current Internet messaging systems:
  – Flexibility
  – Security
  – Integration
  – Scalability

• Approach: Construct a Unified Messaging System based on Web Service Infrastructure and XML Messaging
  – Standardized and Extensible
  – Scalable
  – Widely adopted
  – Full-blown security specifications
Distributed Components and Messages

- **SD**: Sender Domain
- **SC**: Sender Client
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- **RS**: Receiver Server
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[XMLDSIG/XMLENC]

SOAP/TLS/TCP
• Plug-In
• Policy based email services
  – Ingress & Egress Policies
  – Policy Advertisement
  – Policy Negotiation
  – Policy Merging
Policy Architecture

http://seclab.cs.uiuc.edu  http://wsemail.ws
Policy Architecture

SMTA
Merged Policies
Recipient

http://seclab.cs.uiuc.edu
http://wsemail.ws
Puzzles

- Increase cost of sending e-mail
- Hash Cash
  - Usually non interactive
  - Computational puzzle
- Reverse Turing Test (RTT)
  - Human interactive

http://seclab.cs.uiuc.edu  http://wsemail.ws
Welcome to Yahoo! Mail

Login Failed.
Please use the correct password and type the word you see in the picture below.

Try the following hints.
- You must enter the word you see in the picture.
- To ensure the security of your account we require you do this after 5 failed attempts to login.

http://seclab.cs.uiuc.edu

http://wsemail.ws
Issues & Future Work

• Policy specifications
• Complex negotiation and merging
• Privacy issues
• Integration with WS-* standards
• Secure workflow
• On-demand attachments