Web Mashups: Data Integration Artwork

Web Mashups are third-party web applications that integrate data collected from several other data sources in novel ways.

Mashups not only pull from different data sources but also collect different types of data. RSS feeds, multimedia, HTML and services like E-Mail can all be presented through a single web page.

Web Mashups have become one of the textbook examples of what is often called "Web 2.0". Mashups are the result of collaboration and extensibility, these are the cornerstones of Web 2.0 design.

Problems for End-to-End Cryptography

As useful as Mashups are, they pose serious problems for traditional cryptography protocols. But without a system that allows Mashups to have a role in secure communications their overall usefulness is limited.

In cryptographic terms, Mashups are a direct violation of the principle of End-to-End cryptography. Any secure communication that does not include the Mashup will have none of its benefits.

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A Layered Approach

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Step #1 - Mashup Requests Ticket

- The Mashup server requests the client release of information from a site that requires the client's authentication. The data requested is separated into two groups:
  1. Data that the Mashup needs to process before returning the web page.
  2. Data that can be processed by the user's browser after returning the web page.

- Client creates a signed ticket for the Secure Server that the Mashup can use to obtain the authorized information.

- The type of information which is to be released back to the Client.

Step #2 - Mashup Retrieves Secure Data

- The Mashup wraps the Client's ticket in its own ticket and sends it to the Secure Server. The Mashup's ticket contains:
  1. Authentication data which verifies the Mashup sending the request is the same one authorized by the Client.
  2. Details on how to securely transmit the returned data.

- The Secure Server unwraps both the Mashup and Client Ticket and verifies the identity of both parties.

- The Secure Server retrieves the User's requested data and atomizes it according to a published schema so that the mashup can properly process the data when it is returned. The atomized data is then grouped by who the data will be disclosed to, Mashup or Client.

- Data intended for the client alone is encrypted with the client's encryption key.

- The entire response with the Mashup's authorized data and user's encrypted data is secured using the Mashup's key and send back to the Mashup for processing.

Step #3 - Mashup Returns the Webpage

- The Mashup decrypts the message from the Secure Server and processes the information that has been released to it. The encrypted data viewable only by the Client is embedded into the Mashup page along with the scripts needed to process it.

- The user renders the page and in the process decrypts the private data, processes it with the scripts provided by the mashup, and integrates it into the displayed page.

Sample Mashup HTML

```
<!DOCTYPE html>
<html>
  <head>
    <title>Mashup Example</title>
  </head>
  <body>
    <div id="container">
      <h1>Sample Mashup</h1>
      <p>This is a sample Mashup that integrates data from several sources.</p>
      <div id="secure-data">
        <!-- Secure data content here -->
      </div>
      <div id="mashup">
        <!-- Mashup content here -->
      </div>
    </div>
  </body>
</html>
```

Online shopping has also fueled the growth of Mashups which compare prices through various vendors to find consumers the best deal. SecretPrices.com integrates product data from Shopping.com and Amazon.com to compare prices and vendor ratings.