

SMART Apps

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What is SMART?

- Substitutable Medical Apps, Re-usable Technology
- www.smartplatforms.org
- A Harvard Medical School initiative
- Data and technical standards

The Problems

- Vast amounts of data are locked inside proprietary systems
- Use and visualisation of that data is limited to what the vendors provide
- Every proprietary system works differently and stores data differently

The ideal

- Create a system / platform independent way for web developers / designers to build innovative new extensions to any healthcare systems
- No knowledge of specific healthcare systems required
- Apps will just work on any system
- No need to go cap-in-hand to vendor for extensions to their system

SMART

- “SMART provides a unified mechanism for diverse applications to interact with medical-record data”
- “SMART Apps built against the SMART API can be embedded within any SMART Container”

SMART Container

- “A SMART Container is, most often, an Electronic Medical Record (EMR) system used by physicians, but might also be a Personal Health Record (PHR) such as Indivo used by patients, or a data-analytics platform used by researchers”

SMART-enabling VistA

- VistA:
 - The EMR developed by the US Dept of Veterans Affairs
 - Available as an Open Source EMR
- SMART-enablement project:
 - Managed by Harvard Medical School
 - An opportunity to demonstrate SMART technology on a real, industrial-strength EMR

Objective

- To create a SMART Container for Vista
- Contract awarded to E-cology
 - Joseph Dal Molin
 - George Lilly
 - Rob Tweed

SMART standards are the key

- Data standards
- Technical standards

Data Standards

- SMART identifies core data categories
 - Demographics
 - Medications
 - Vitals
 - Problems
 - etc

Data Standards

- SMART specifies that data is mapped to Resource Description Format (RDF)
 - XML standard
 - Describes Triples
 - Part of the W3C Semantic Web standards

Querying RDF

- SPARQL is the standard query language for querying RDF graphs
 - SQL-like syntax
 - Somewhat arcane

JSON future

- JSON is on the horizon for next SMART version
 - Replacement for RDF/XML
 - Much easier for Javascript developers to handle

Technical Standards

- “A SMART app is a web application that is loaded in an IFRAME hosted by a SMART container”

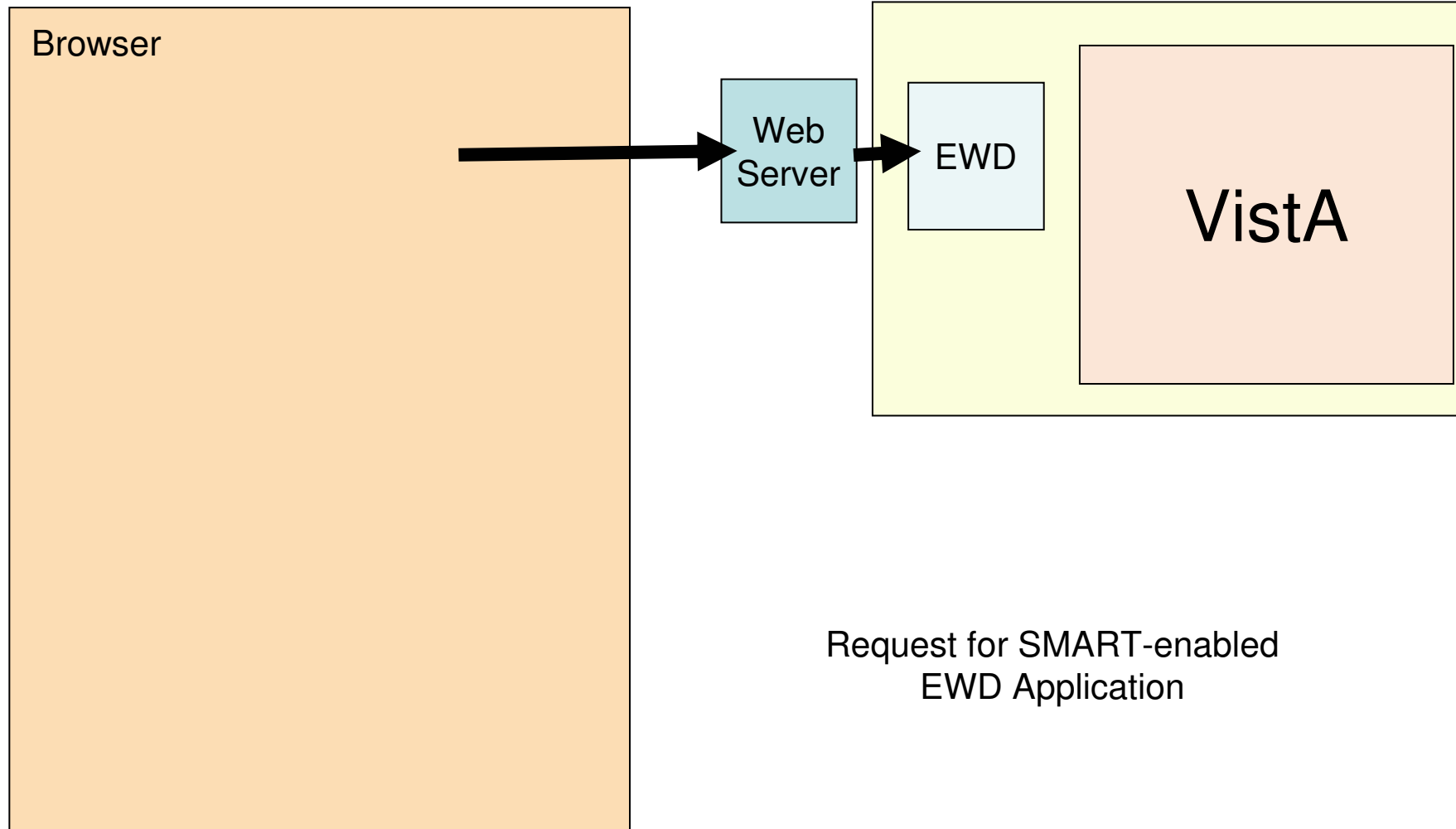
Technical Standards

- SMART Container for Vista must be:
 - Web-based
 - Automated as much as possible/practical
 - Secure
- RDF data has to be transported over HTTP to the browser's IFRAME
 - Essentially a web service

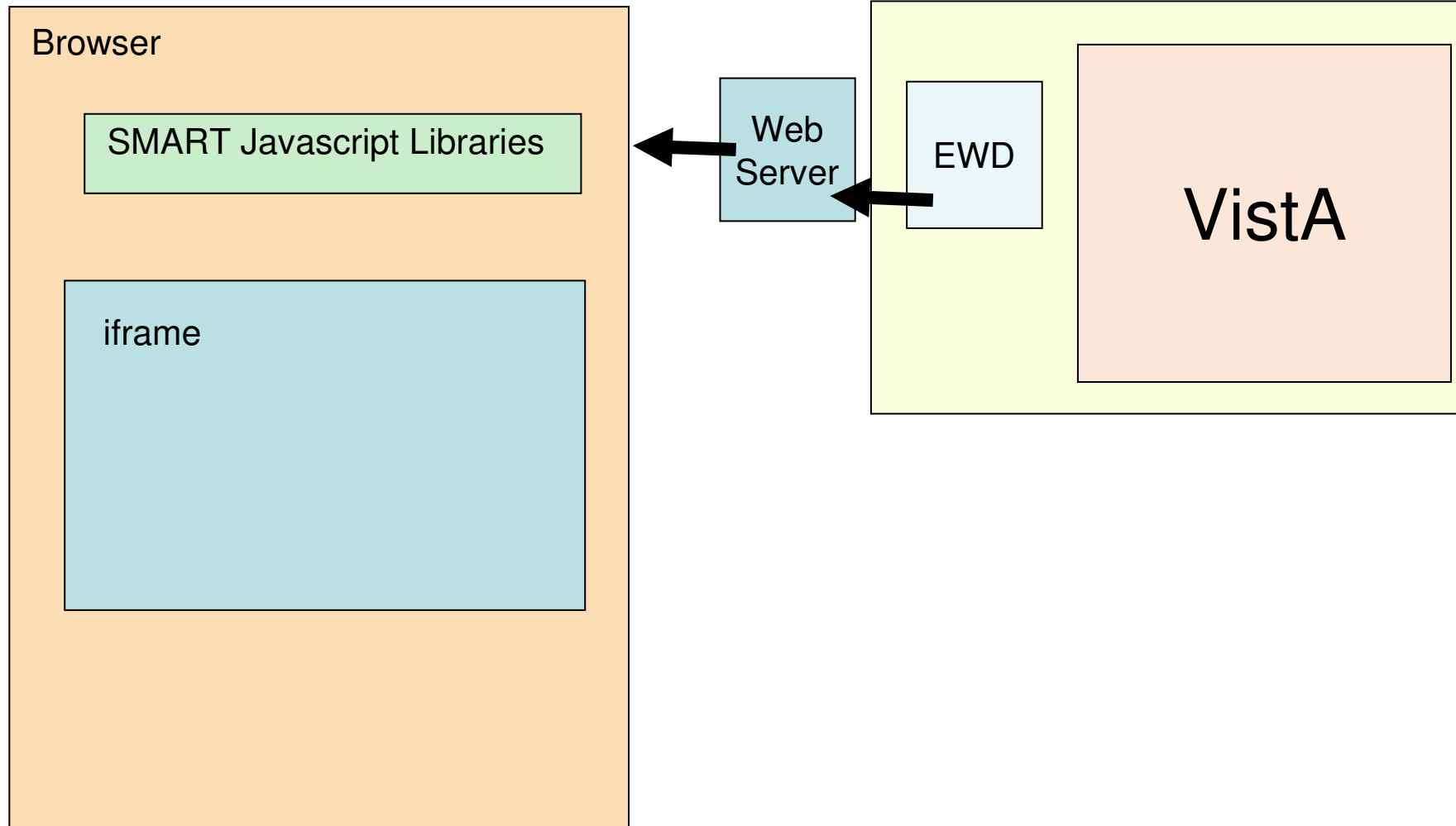
Two Types of SMART App

- Self-contained
 - Runs entirely in an iframe within the browser
 - Uses Javascript to get data from host system
- Server-based
 - Runs on a third-party server somewhere on the internet
 - Server uses REST calls to obtain data from host system
 - Secured using OAuth

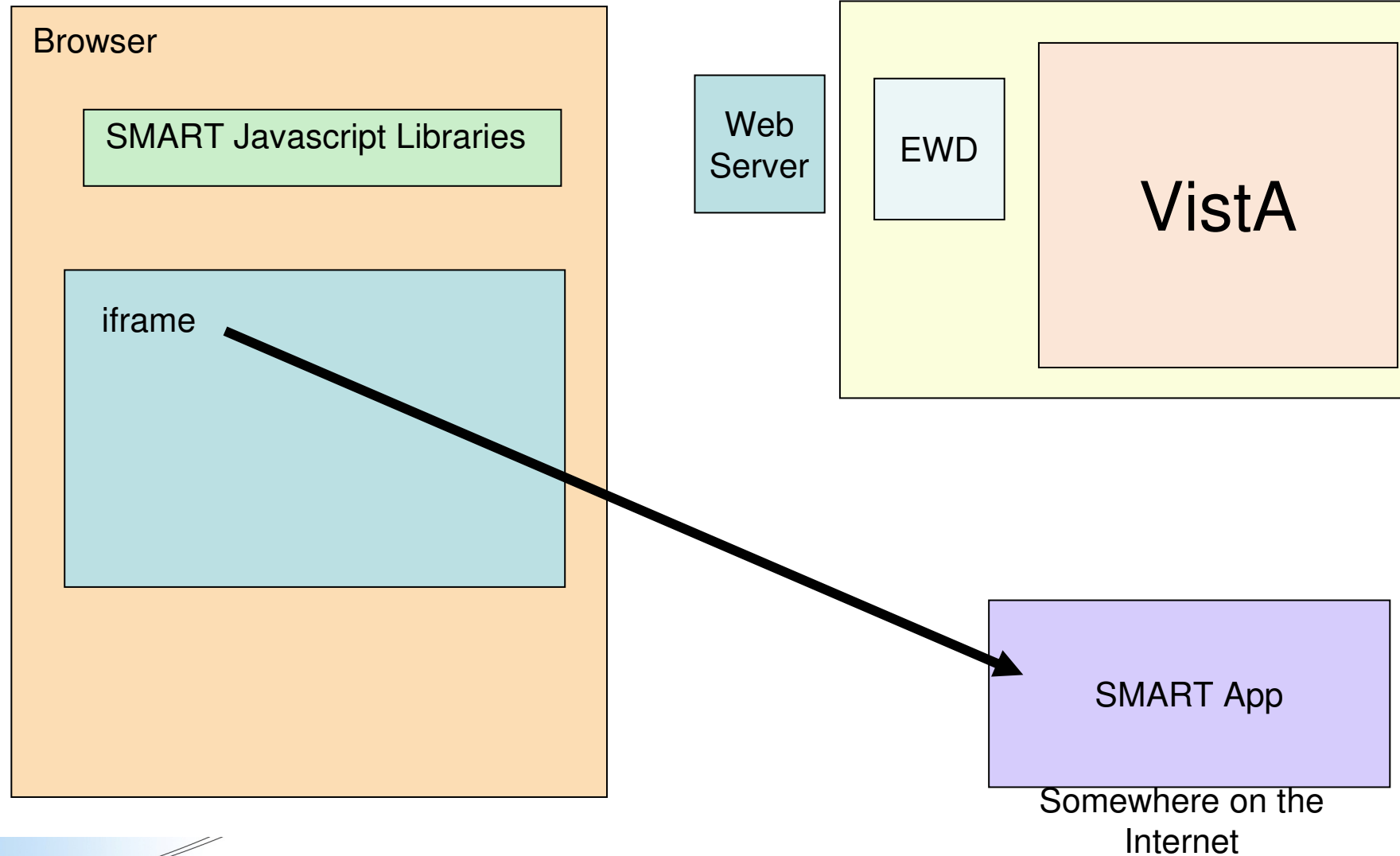
Mechanics of a SMART App



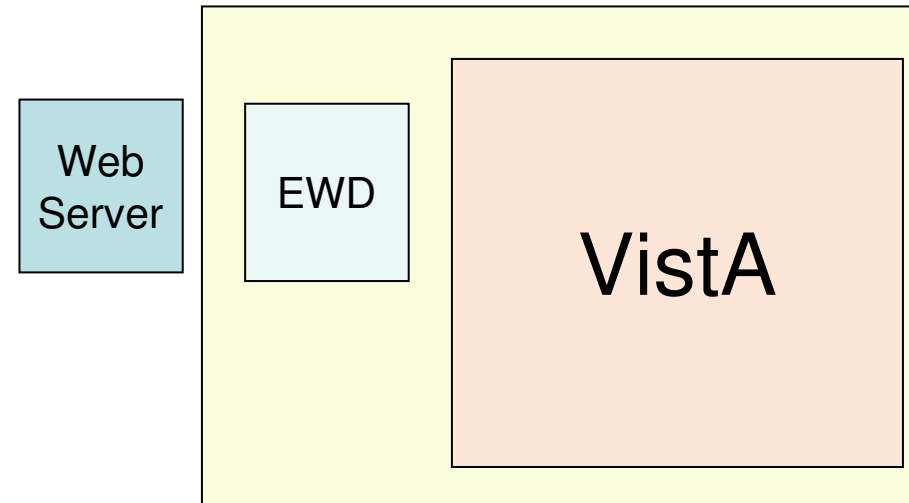
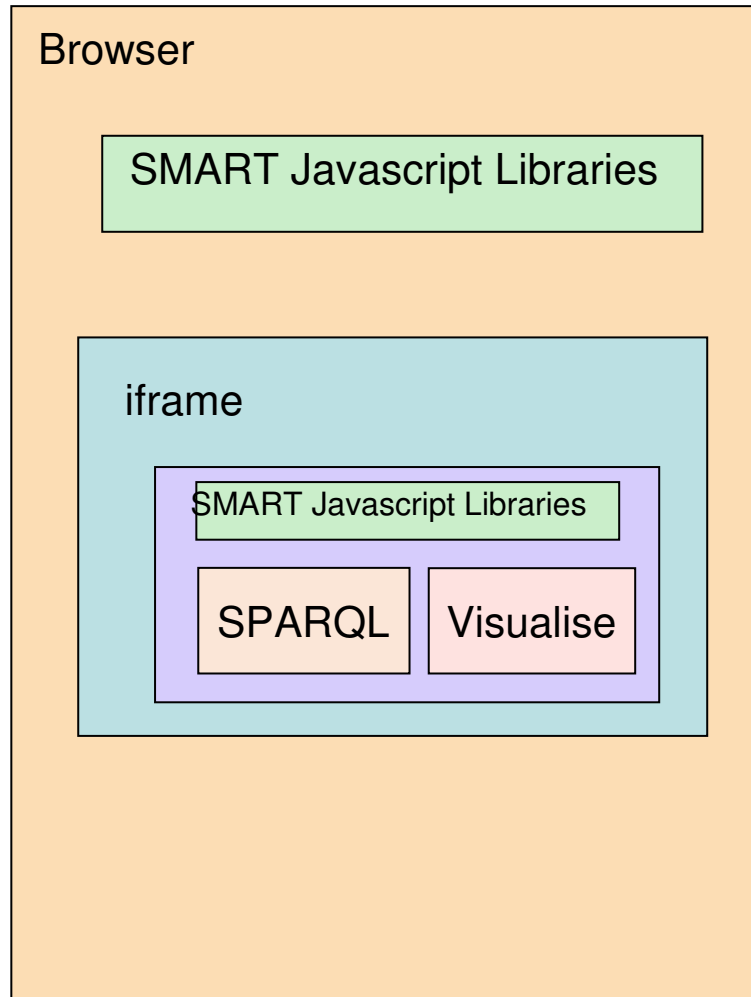
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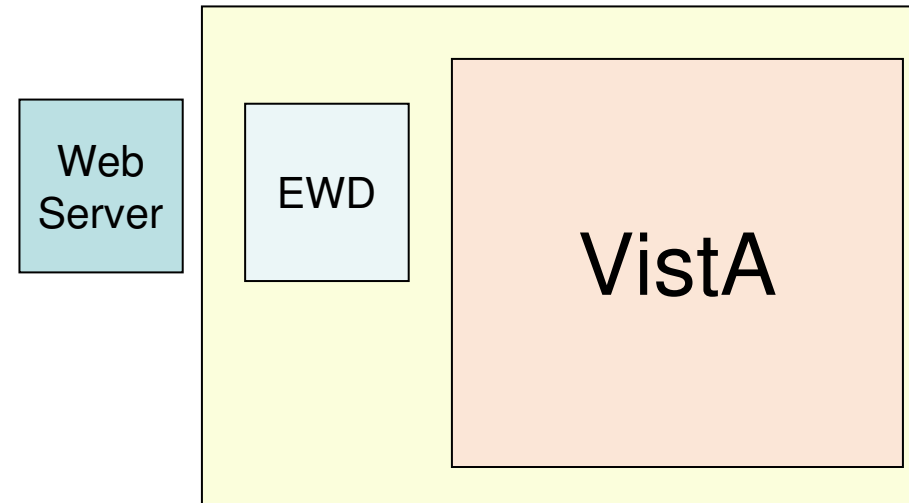
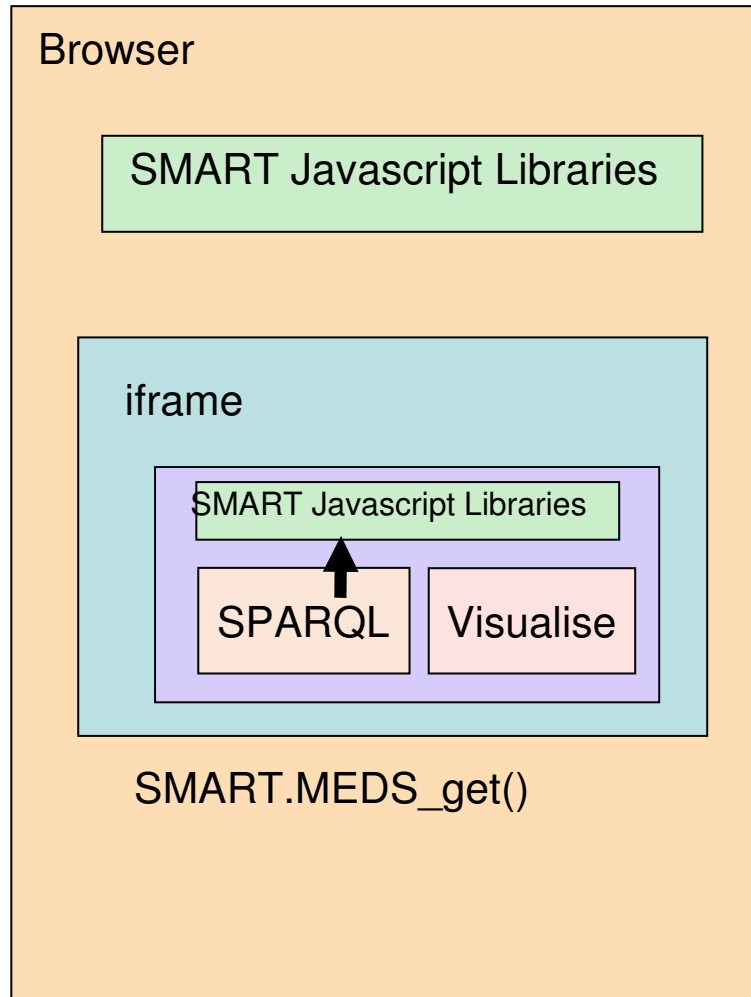
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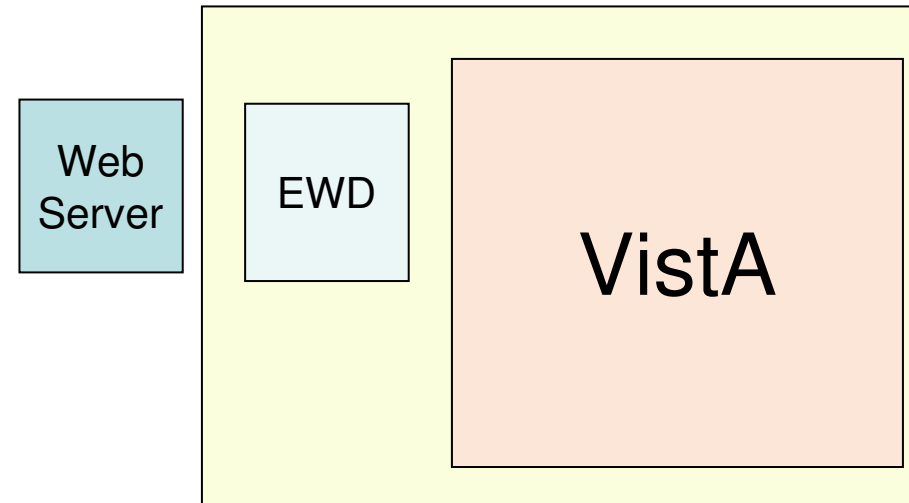
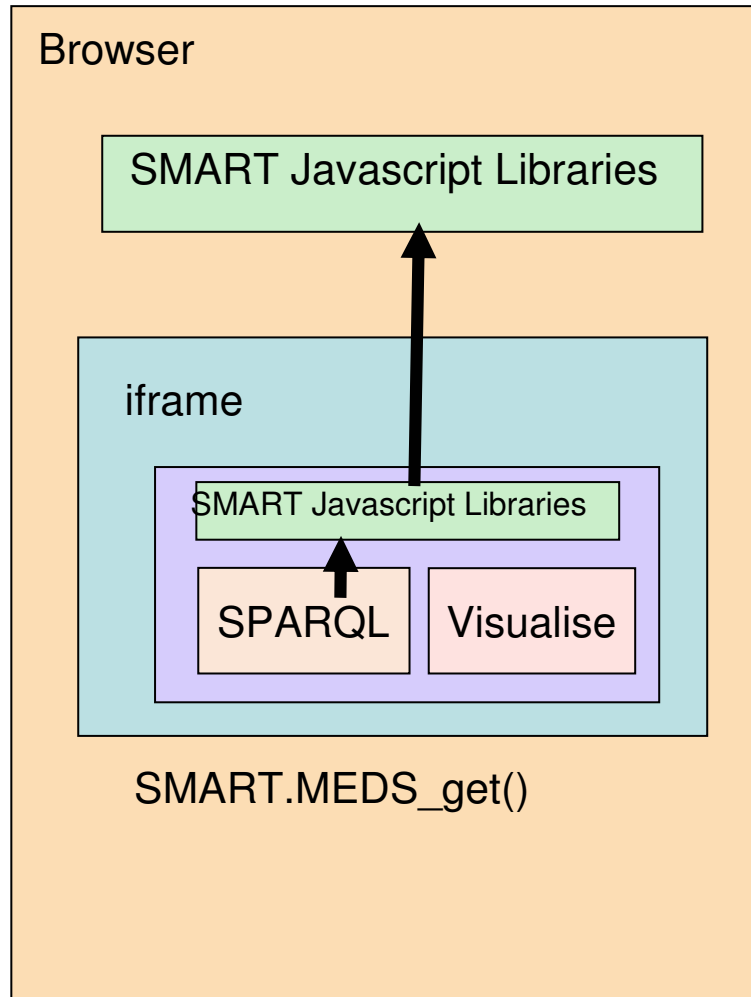
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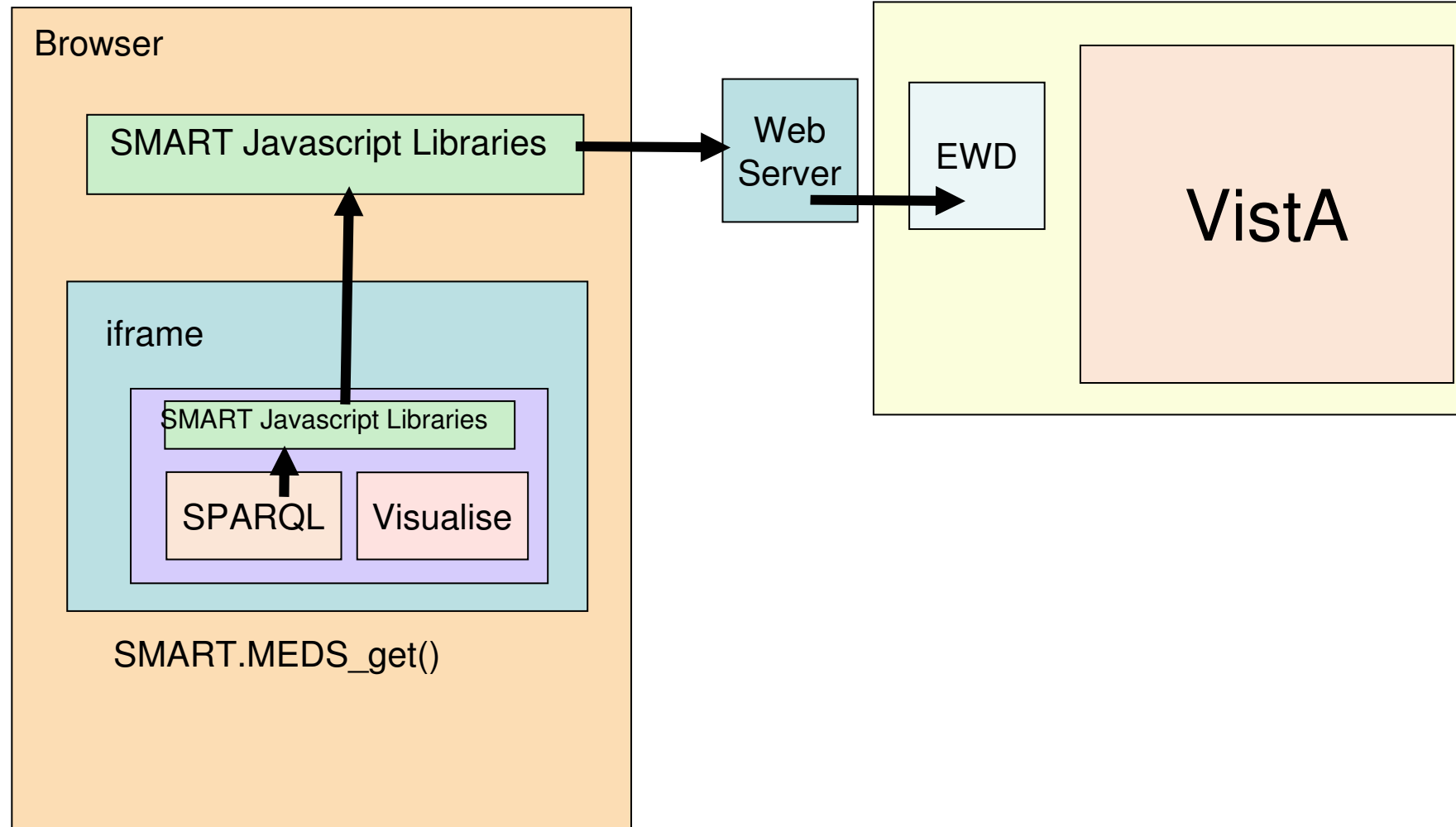
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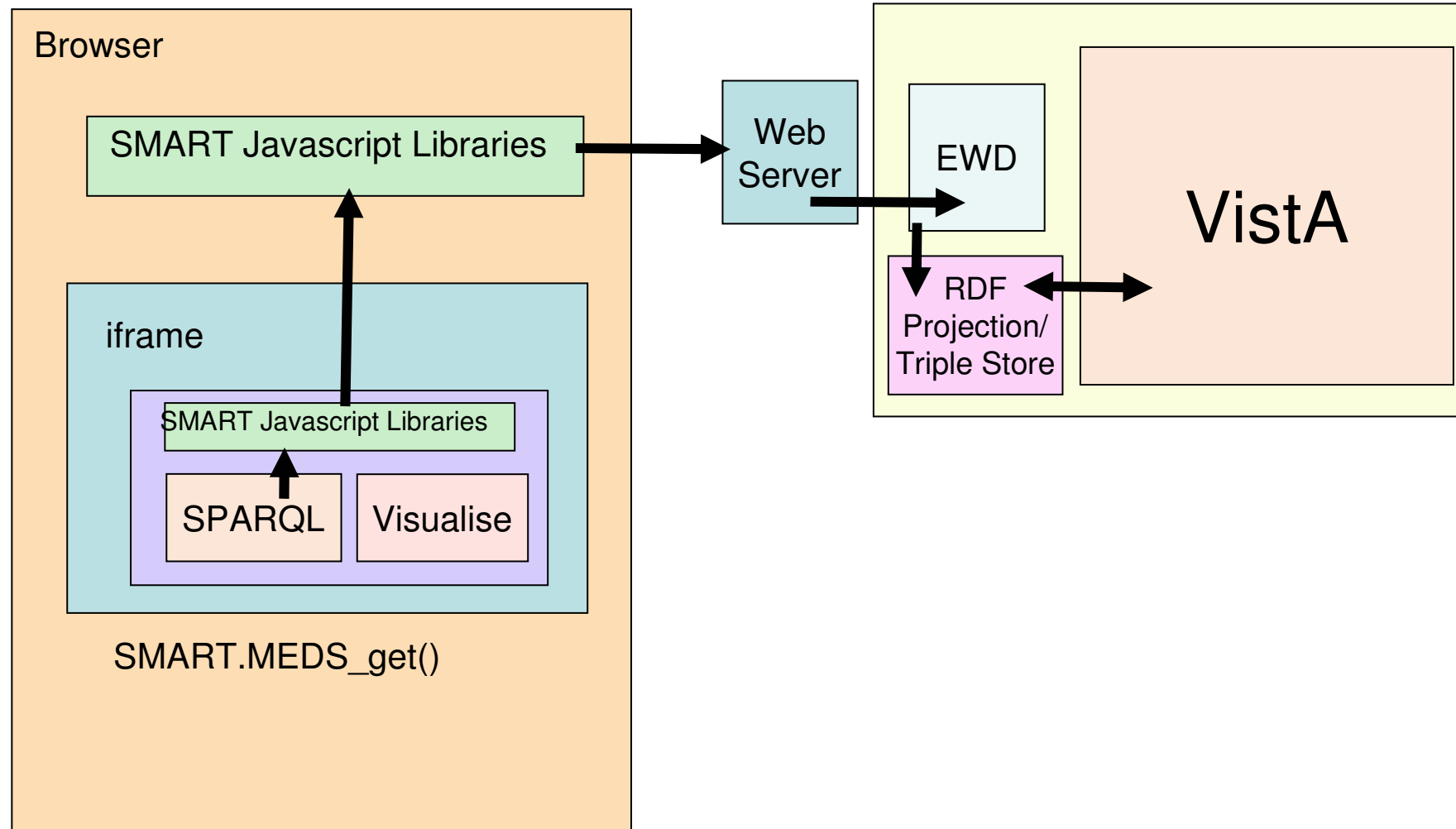
Mechanics of a SMART App



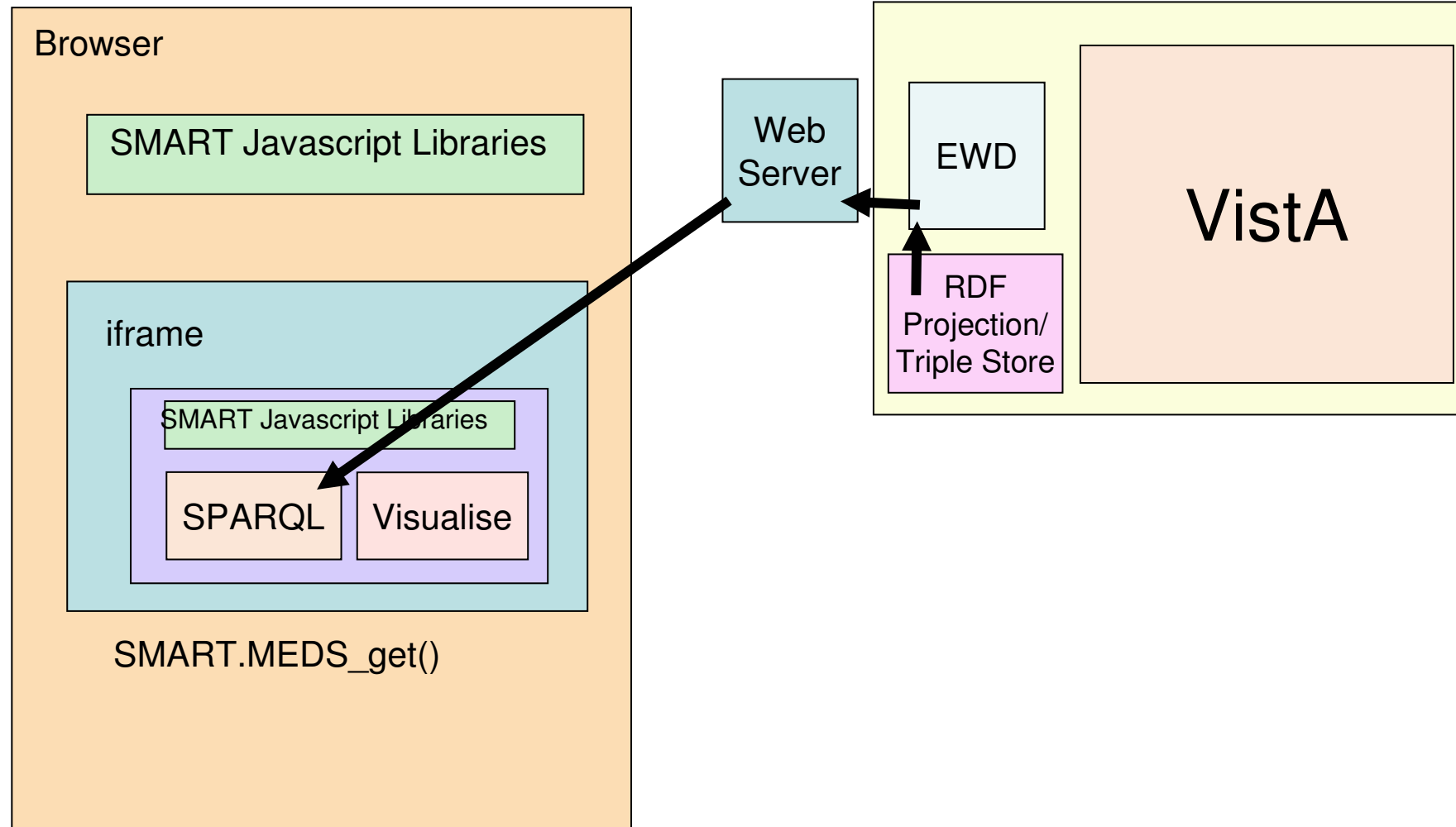
Mechanics of a SMART App



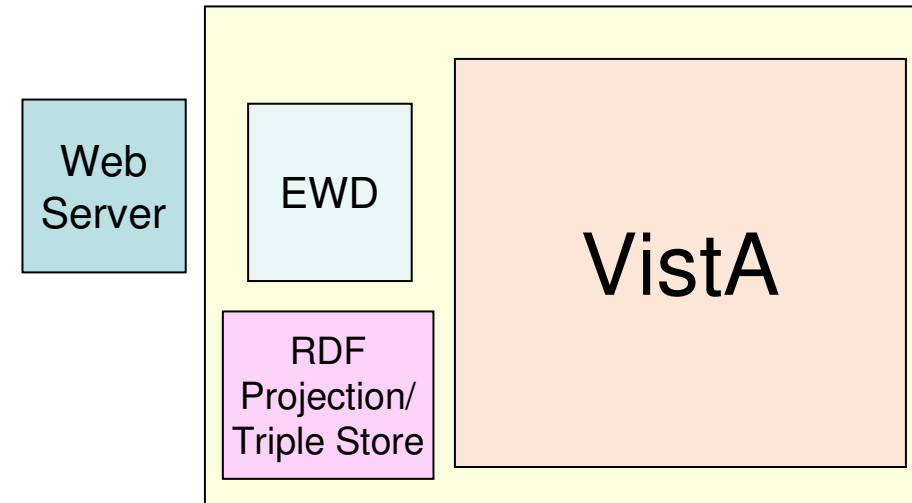
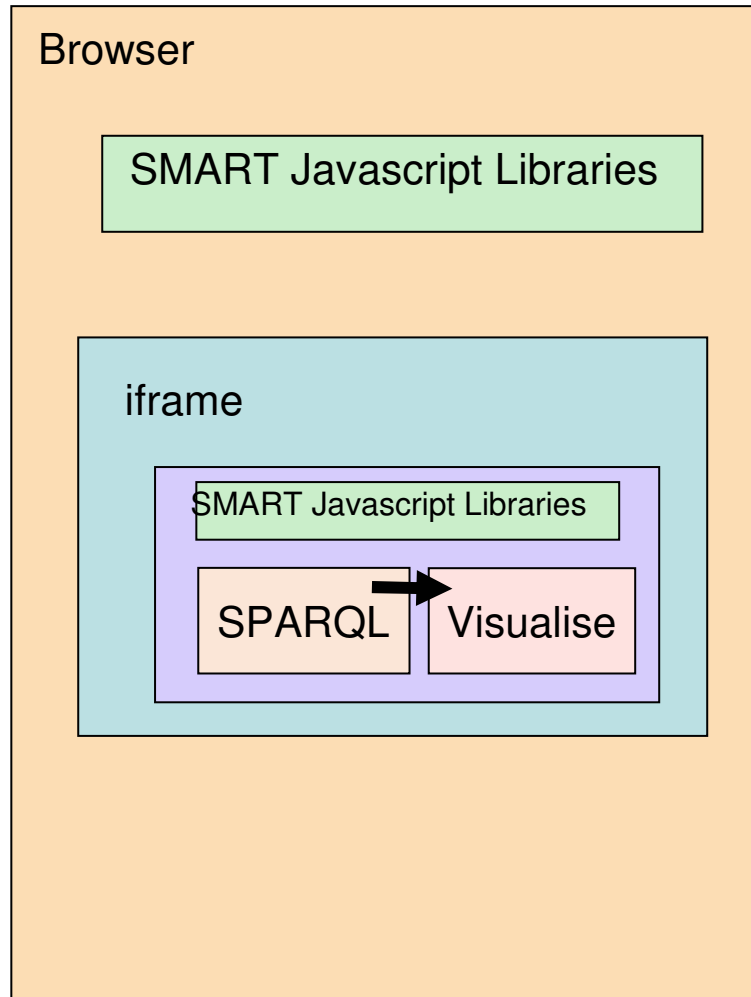
Mechanics of a SMART App



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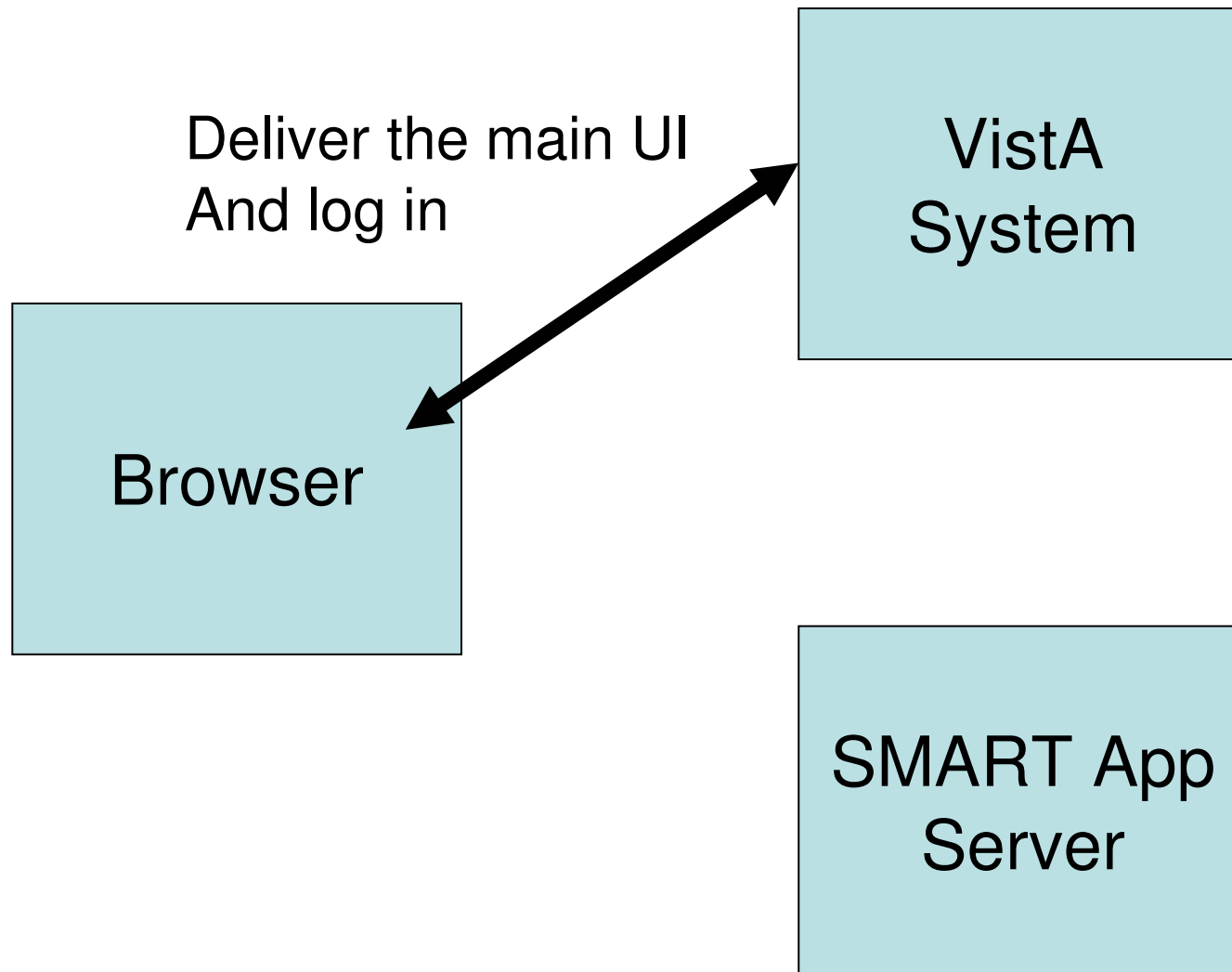
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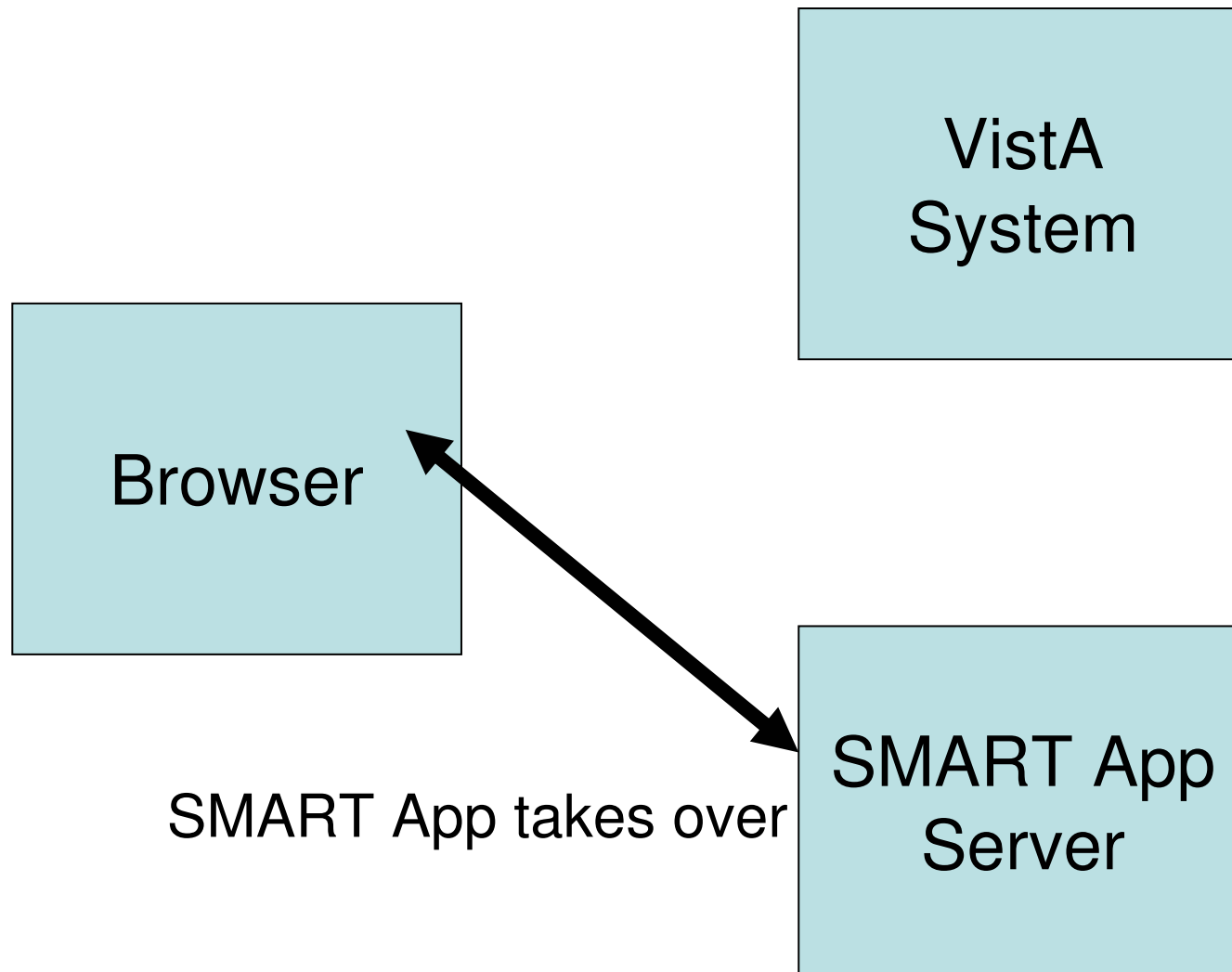
Mechanics of a SMART APP

- SMART REST app
 - Server-side logic on third-party server
 - Fetches and uses data from a VistA server via REST calls
 - User interface in browser

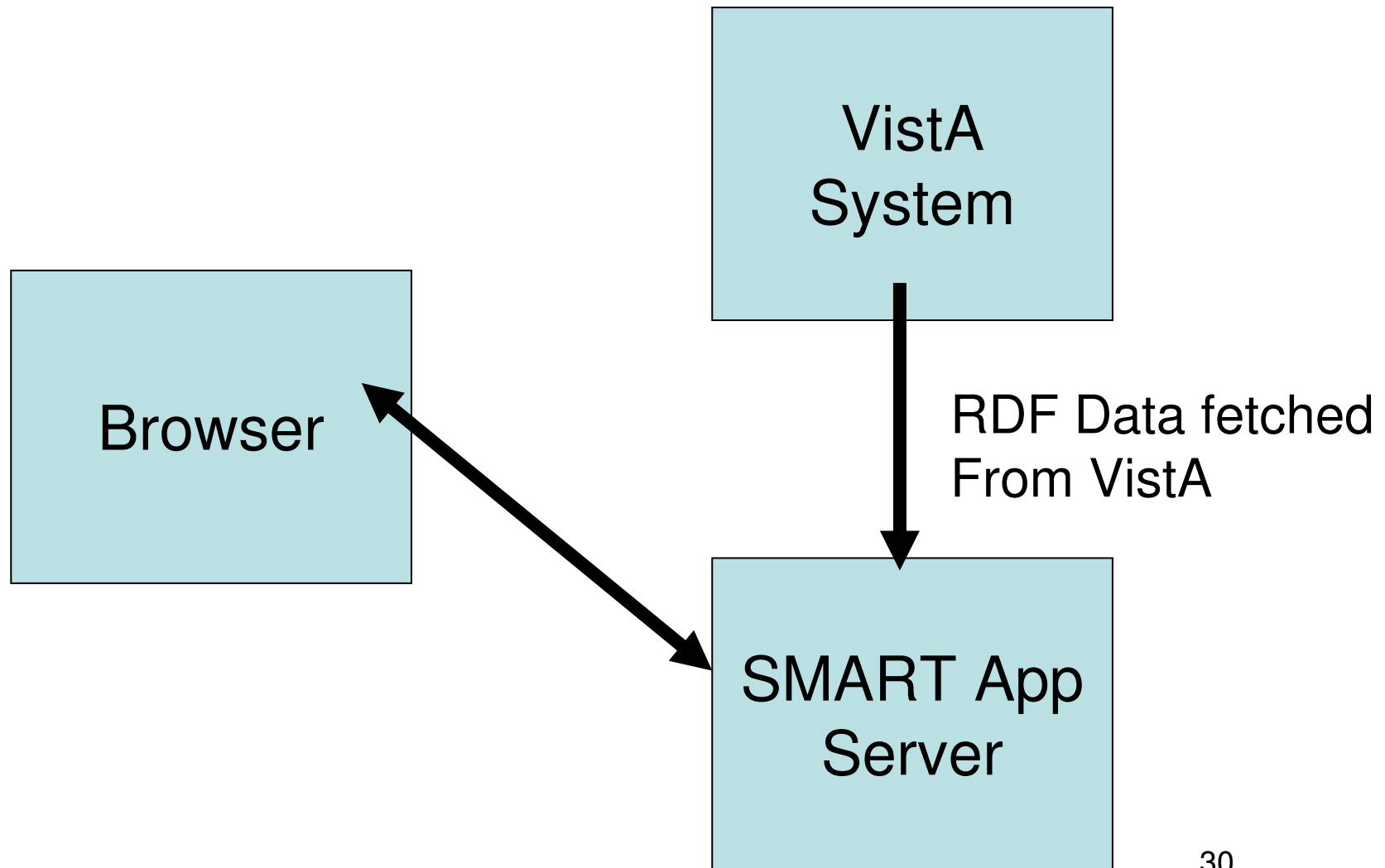
Using REST with SMART



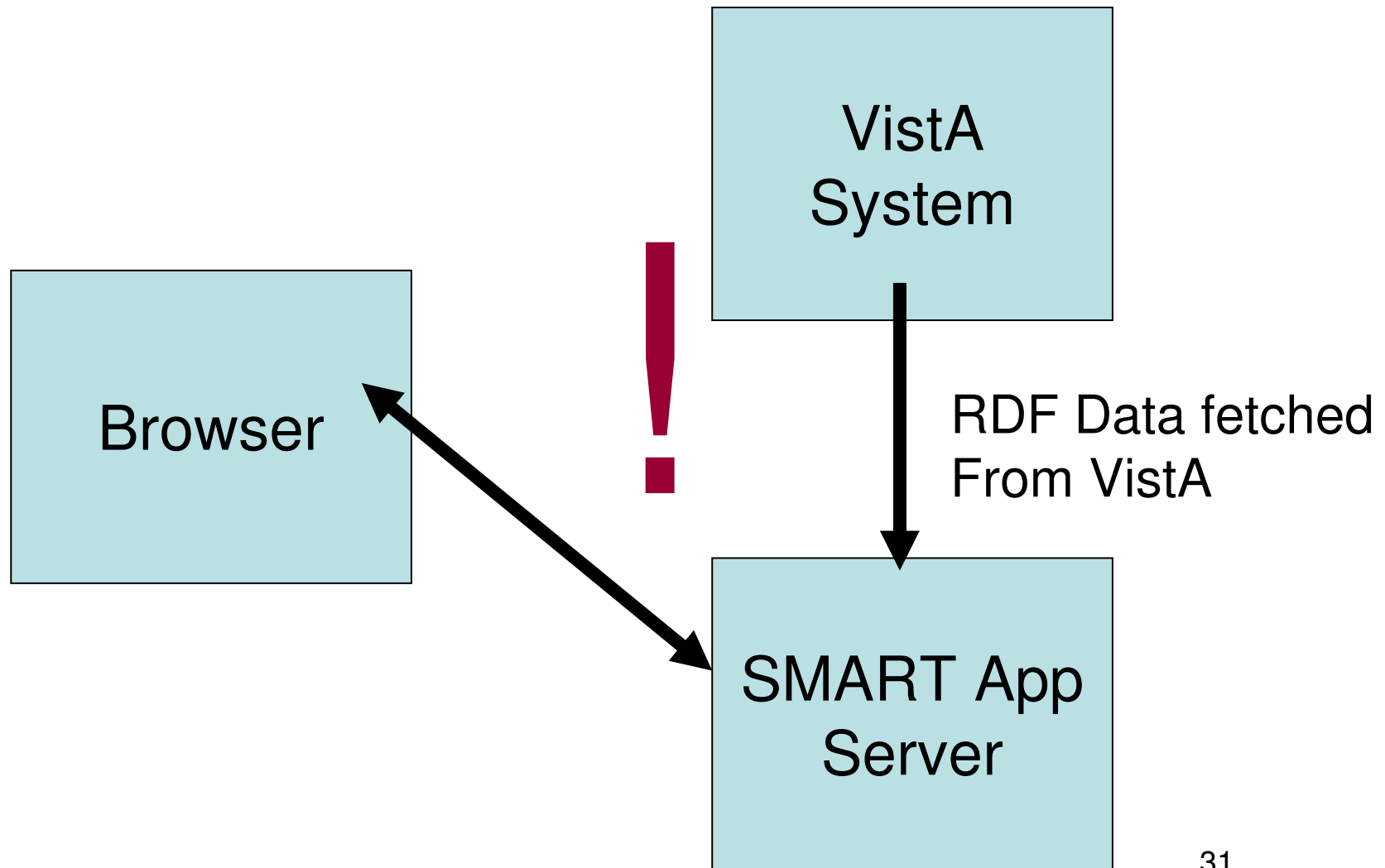
Using REST with SMART



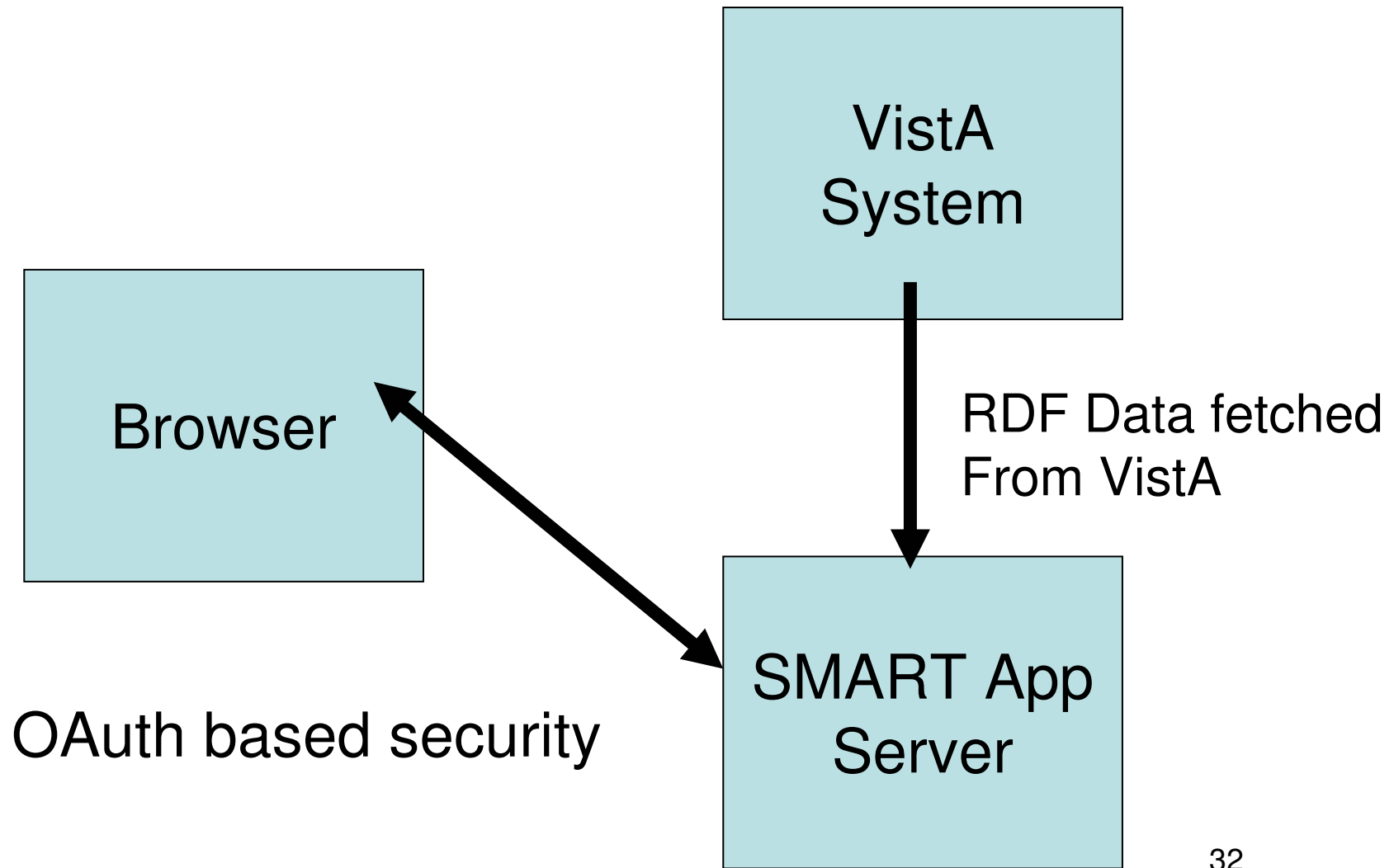
Using REST with SMART



Using REST with SMART



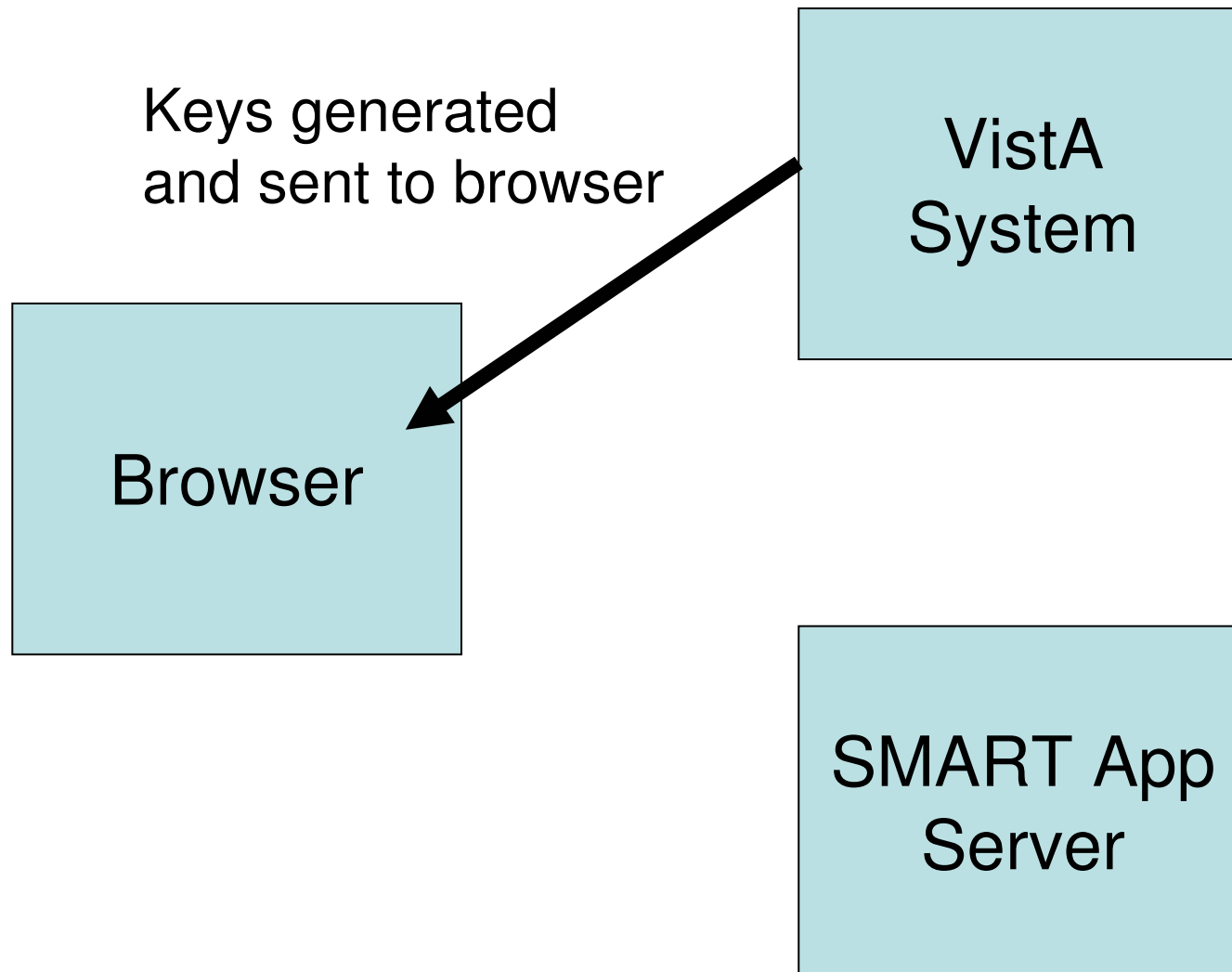
Using REST with SMART



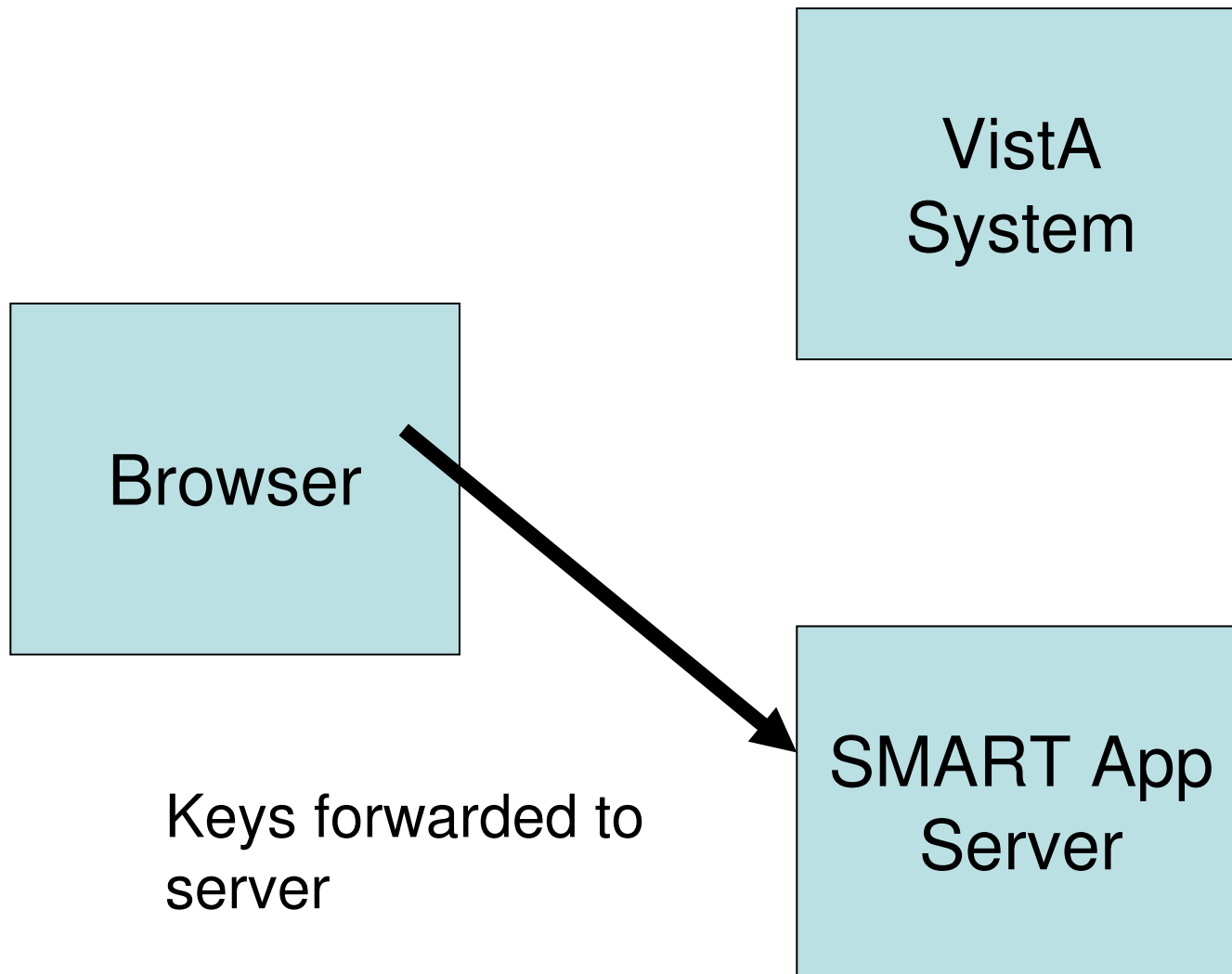
OAuth

- The OAuth 2.0 authorization framework enables a third-party application to obtain limited access to an HTTP service
- Equivalent to your car's valet key
 - Limited access to your car
 - Limited distance it can be driven
 - No access to trunk
 - You decide who to give it to and when

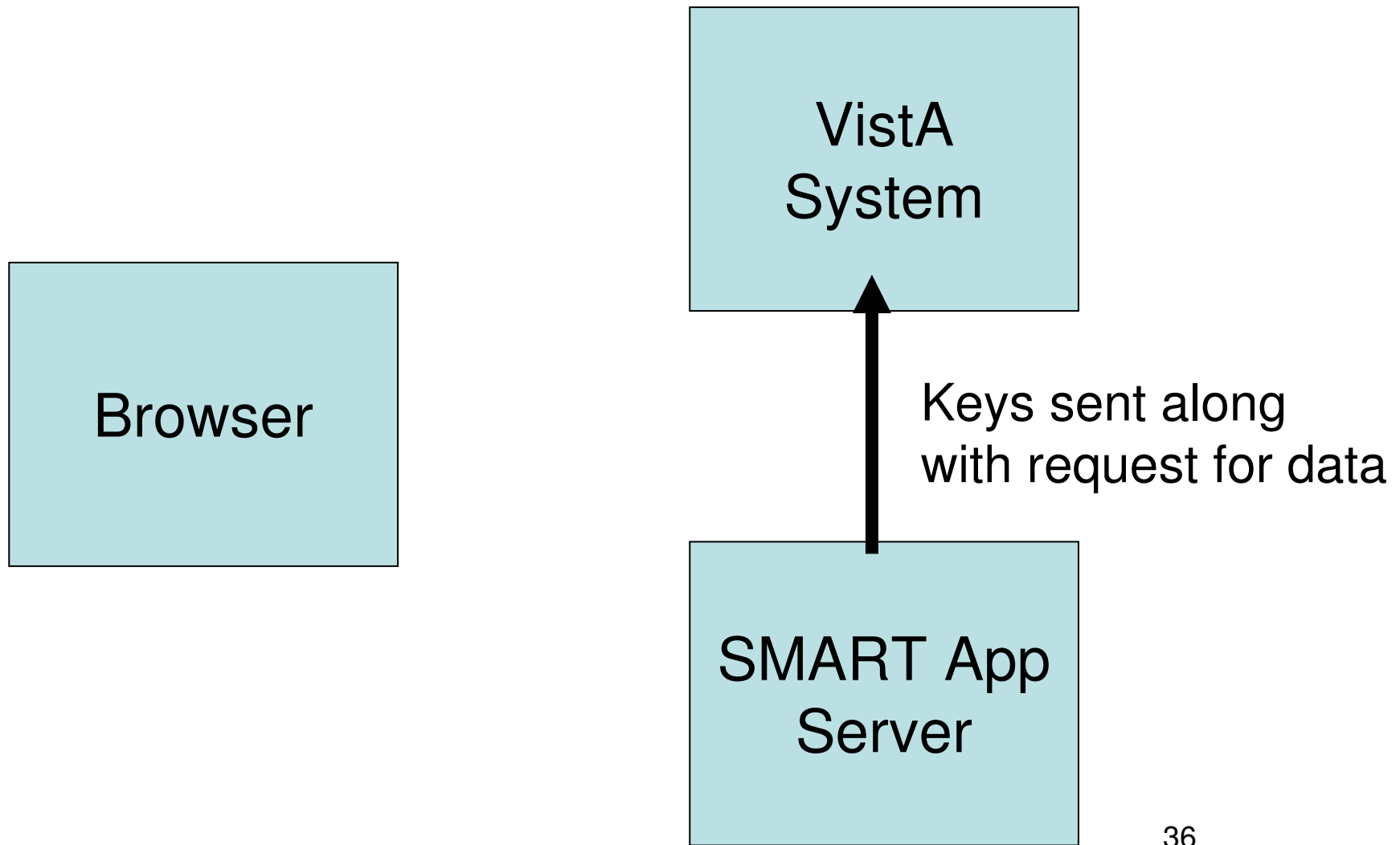
oAuth Key Exchange



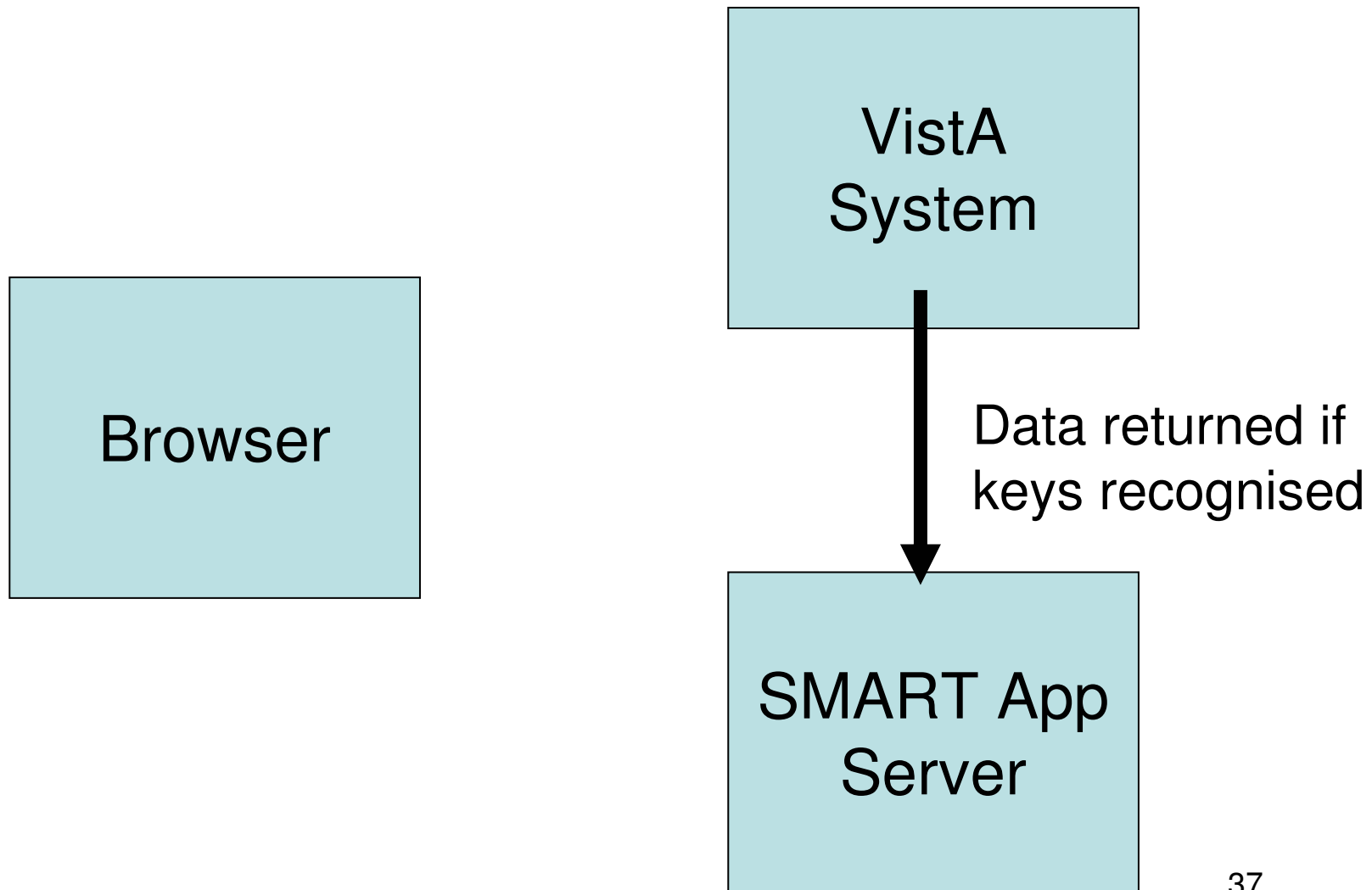
oAuth Key Exchange



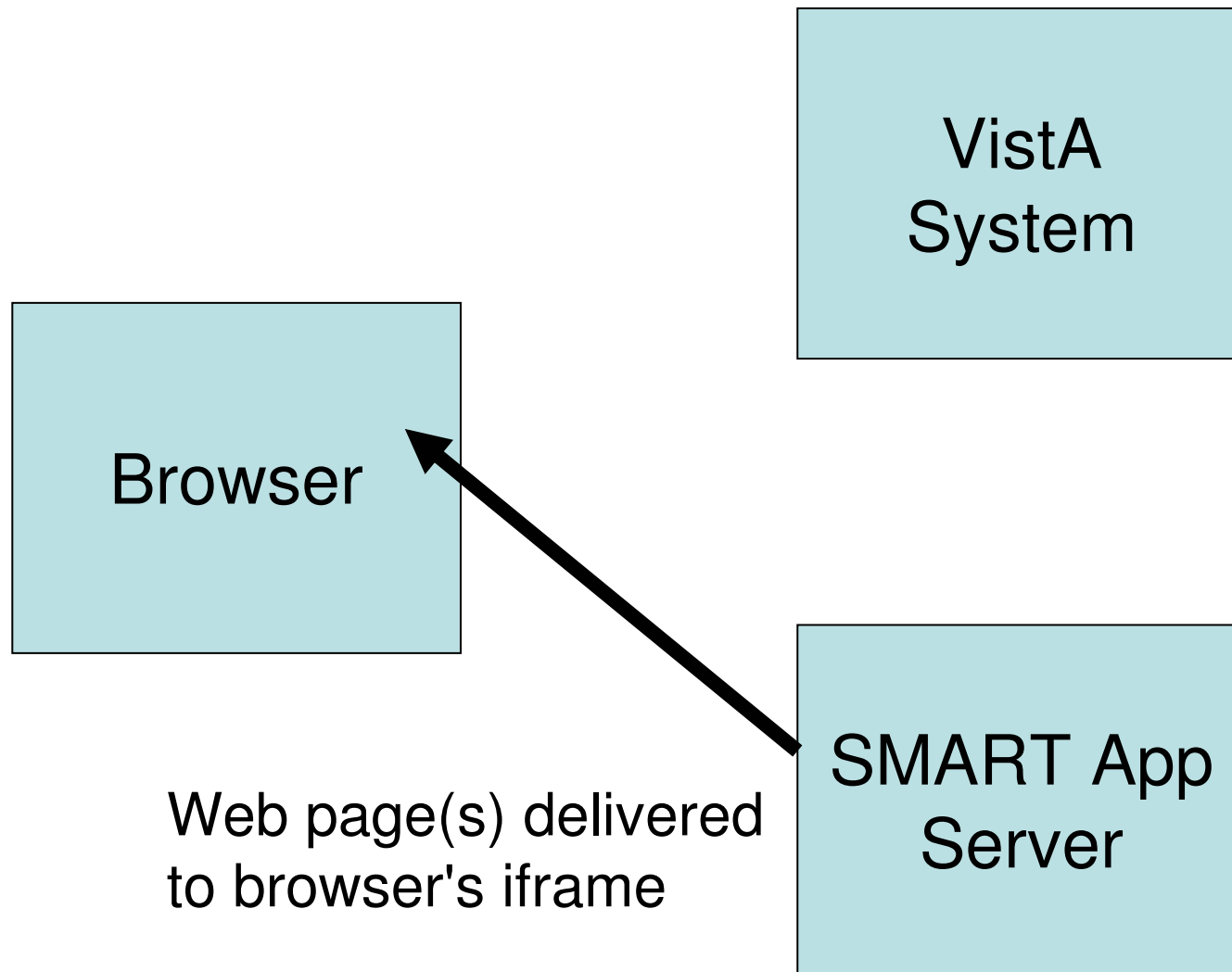
oAuth Key Exchange



oAuth Key Exchange



oAuth Key Exchange



Smart-enabled VistA

- Demos



Potential for SMART in UK

- Any healthcare system could be SMART-enabled
- SMART Container is required:
 - Mapping of core clinical data sets to RDF
 - Technical web and security mechanisms

SMART Limitations & Challenges

- Currently read-only
- Currently patient-specific
- Attaining uptake by commercial EHR vendors
 - Attaining critical mass
- Data standards probably US-centric in some areas

Conclusions

- SMART demonstrates that vendor-independent Apps are possible
- Backed by Harvard Medical School
- Avoid re-invention of the wheels by building on SMART
 - UK-specific extensions / modifications?