08: REST constraints (i.e. design rules) interview Q&A

Posted on June 17, 2015 by Arulkumaran Kumaraswamipillai

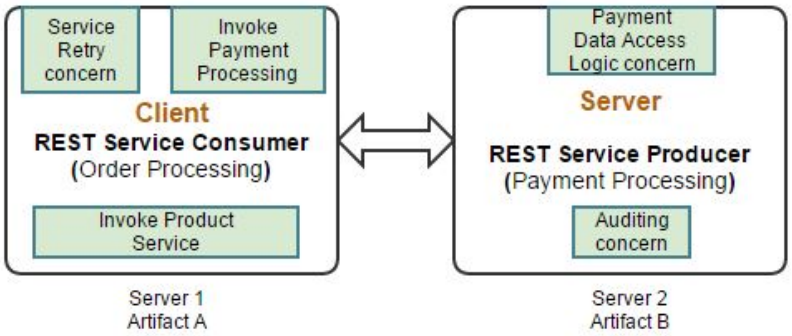
Q1. What are the 6 REST constraints?

A1. REST constraints are design rules that are applied to establish the distinct characteristics of the REST architectural style. These constraints don't dictate what kind of technology to use, and they only define how data is transferred between components and what benefits we reap by following these constraints.

- Client-Server
- Stateless
- Cacheable
- Uniform Interface
- Layered System
- Code On Demand (Optional)

Q2. What is the key focus of “Client-Server” constraint?
A2. Separation of concerns and loose coupling.

The purpose of this division is to separate architecture and responsibilities in both environments. Thus, the client (consumer of the service) does not care about tasks like database logic, cache management, logging, auditing, etc and the service provider is not concerned about tasks such as service retry, user experience, etc. Fundamentally this is a distributed architecture, thereby supporting the independent deployment of client-side & server-side artifacts and evolution of the client-side logic and server-side logic.



Note: A client can be browser or another application written in Java or other languages.

So, implementing a concern wrong side of wire or having a concern half implemented on client side and the rest on the server side can tightly couple client and server. For example, client having its own payment logic in addition to the logic on the server side. This means, if the server logic changes then the client logic may need to change as well.

Q3. Why should the REST call be stateless?
A3. Stateless services are more **scalable** and **reliable** as the state is not maintained on the server. The call can go to any server on the cluster as state is not maintained on the server. This means each request from client to server must contain all of the information necessary to understand the request, and cannot take advantage of any stored context on the

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server. The session state is therefore kept entirely on the client. This improves **Visibility** since a monitoring system does not have to look beyond a single request. **Reliability** is also improved due to easier recoverability from any partial failures.

Q. What are the tradeoffs of being stateless?
A. Reduced network performace due to larger payload. This is where the constraint of "**Cacheable**" becomes handy. The "second fetch" doesn't have to be made at all if the data is already sitting in your local cache. If the data can be designed in such a way to take advantage of this, you can reduce total network traffic.

REST services use both server-side caching and client-side caching. Server side caching requires tools like Squid from squid-cache-org, DynaCache from IBM, etc. Client-side caching is achieved by using cache directives in the response header. "Expires", "Cache-Control: max-age=n", etc. The "**expiration model**" of caching is good for static resources like images. For dynamic data, you should use a "**validation model**" of caching.

Q. What is a "Validation Model" for caching involving both client and server side?
A. I this model a unique identifier called an **ETag** is used. When you make a subsequent request to the same resource, you should send this **ETag**. The server uses this identifier to check if the resource you requested has changed. If the resource has changed, it sends you the latest copy.If not changed, it sends a response code of "304 Not Modified". Validation model requires development effort on both client and server side. The validation model uses **ETag** and Last-**Modified** HTTP Headers.

Q What are the tradeoffs of caching?
A Stale data may reduce reliability.

Q4. What do you understand by the term "Uniform Interface" with respect to REST?
A4. This basically means a well defined and easily

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understandbale contract for communication between clients and server. A uniform interface has four sub-constraints

1. **Identification of resources:** Each resource must have a specific and cohesive URI to be made available. E.g. http://localhost:8080/mayapp/user/1234. REST URI Conventions
2. **Manipulation of resources through representations:** Representation of the resource need to provide enough information to manipulate the resource. For example, Book info with links to provide comments and ratings, list of records with delete button, etc.
3. **Self descriptive messages:** Request or Response can contain data and metadata. The metadata in the request and response can be: HTTP response code, Host, Content-Type, etc. The "Content-Type" is very important as clients and servers rely on this header's value to tell them how to process the sequence of bytes in a message's body
4. **Hypermedia as the engine of application state (**HATEOAS**)**: This returns all the necessary information in response so client knows how to navigate and have access to all application resources. How does it provide state transition, scalability, and loose coupling?

Q5. What does the layered system and code on demand mean with respect to RES constraints?
A5. Your application should consist of layers, and these layers should be easy to change, both to add more layers and to remove them. Components can act as client on one side and as servers on the other side. You can have intermediary services to reduce complxity. The intermediary proxies can provide services like data translation, performance enhancement, load balancing, shared caching, service retries, security, etc.

Code on demand is an optional constraint. It allows a client to download and execute code from a server. For example, JavaScripts, Applets, Flash, etc can be downloaded from the server and executed on the client side. This may have some

tradeoffs like reducing the visibility and some security ramnifications. It is optional because some clients may not support execution of a code.

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