Hypertext Transport Protocol

CMPU4023 - Enterprise Application Development

HTTP (version 1.x)

- HTTP has found popularity as the application layer protocol of choice, somewhat by accident, in the enterprise
- Originally development for a hypertext document management system, it gained popularity because it is so well supported that even technically superior alternatives were pushed aside in its favour
- HTTP 1.x, with its text-based headers and body is the ultimate in simplicity and crudeness but it is well understood and plays well with most enterprise firewall configurations
- Message passing APIs can take advantage of HTTP commands to expose the particular interface semantics in a simple and clean way

HTTP (version 2.x)

- The future of HTTP (as of 2017) is the binary-encoded version 2.x which maintains all of the 1.x capabilities but aims to make encoding more wire efficient and improve performance of transmission
- HTTP 2.x makes better use of the underlying TCP/IP transport layer semantics to support such features and concurrent request/response streams
- From an enterprise perspective, we expect to see adoption of HTTP 2.x but also the continued concurrent use, for many years to come, of the older version 1.x

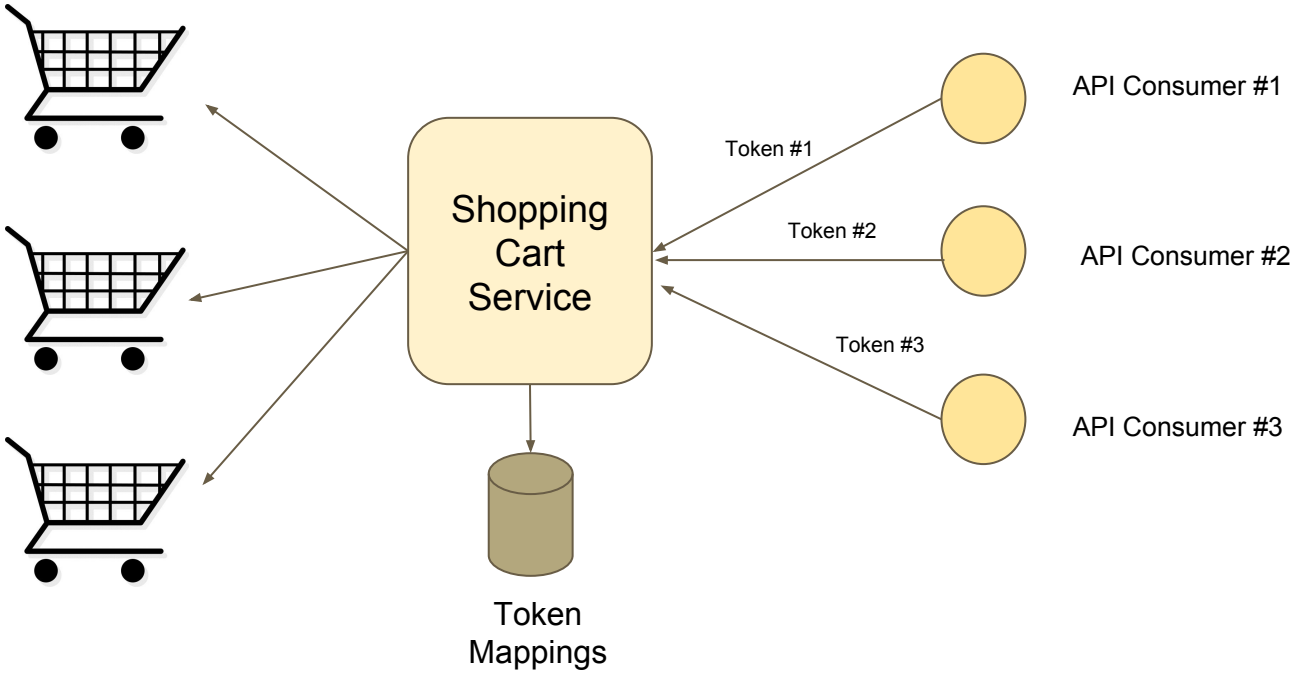
HTTP Semantics

- HTTP is a stateless application layer protocol
- Requests are issued by the sender (client) and responded to by the receiver (server)
- Strictly, each request and response can use its own, independent TCP/IP connection between the client and one or more servers though in practice connection reuse is common for performance reasons
- The connections between clients and servers can be proxied between one or more intermediate nodes, such as load balancers and caches
- Clients and servers cannot make any guarantees about application-level state at the HTTP level making the communications sessionless from this perspective

Session State

- In many cases, each API call to a service is logically independent from any other so HTTP statelessness is not a problem - e.g. RESTful services
- However, sometimes sets of API calls are logically related and even transactionally grouped
- Take, for example, a shopping cart service wherein a clients can add multiple products across different API calls to different carts
- The service must track each client and cart contents and be able to commit orders based on checkout requests
- In such cases, the application layer participants must exchange state information such as tokens to manage these interactions

Shopping Cart Example



HTTP Headers and Tokens

- In the context of HTTP-based messaging APIs, HTTP request headers are used to transmit request metadata such state or authentication tokens
- HTTP headers are standards- and user-defined key/value pairs which can be added to requests in addition to the message body itself
- The service is generally responsible for issuing tokens and maintaining an internal mapping from those tokens to application state and logic
- The client API consumer is responsible, once issued a token, to pass it along with subsequent API calls
- Typically tokens have time-to-live timestamps which the server enforces

Summary

- HTTP is a simple stateless protocol which has become the de facto standard application layer protocol of choice for remote APIs in the enterprise
- It is ubiquitous with standards support and a strong industry and community contributed set of libraries and tools to work with
- HTTP is a suitable solution for both the enterprise intranet and the public Internet and allows various encryption and authentication schemes to be used along side

References

- RFC7230 - HTTP/1.1: Message Syntax and Routing - low-level message parsing and connection management
- RFC7231 - HTTP/1.1: Semantics and Content - methods, status codes and headers
- RFC7232 - HTTP/1.1: Conditional Requests - e.g., If-Modified-Since
- RFC7233 - HTTP/1.1: Range Requests - getting partial content
- RFC7234 - HTTP/1.1: Caching - browser and intermediary caches
- RFC7235 - HTTP/1.1: Authentication - a framework for HTTP authentication