**Multi-tier architecture**

Monolithic:

* Presentation layer: to present to end customer
  + Web Application:
    - HTML5: new tags ?semantic tags?
    - CSS3: 🡺responsive design
      * Media queries
      * Bootstrap is CSS3 frame work(12 grid model)
      * Preprocessing 🡺SaaS, less 🡺 to dynamic preprocess the CSS.
    - JavaScript: can use it in front end and in middle ware.
      * Frameworks: jQuery, Angular, React
      * Libraries: Grunt and Gulp( Node modules)(similar to Maven)
  + Mobile Application:
    - Hybrid and Native
    - App containers 🡺SDK 🡺application code
    - Hybrid application returns HTML,CSS JavaScript
    - Native applications returns swift, Objective C for Ios and Kottlina for Android.
    - React native: uses JavaScript to develop native mobile apps.
    - Angular Ionic: builds hybrid apps.
* Back-end:
  + Servlet and JSP used to send HTML response to client.
  + Application server: primary responsibility is to create thread for each request and maintains servlet life cycle.
  + Two frames in backend:
    - First frame has frameworks like Spring and Struts: provides libraries and architectural style.
    - Second Frame has frameworks like Hibernate and Ibatis.
  + Web Server: It loads all static web pages to client. All other requests gets JSON and XML from backend.
  + After 2nd request proxy is used.
  + AJAX?
  + Webservices are used to respond with XML or JSON.

Microservice: