5.Layout

Layout and Dirty Bit System

1. **What is Layout?**

   When the renderer is created and added to the tree, it does not have a position and size. Calculating these values is called layout or reflow.

2. **How does layout work?**

   - HTML uses a flow based layout model, meaning that most of the time it is possible to compute the geometry in a single pass. **Elements later ``in the flow'' typically do not affect the geometry of elements that are earlier ``in the flow''**, so layout can proceed left-to-right, top-to-bottom through the document. There are exceptions: for example, HTML tables may require more than one pass.
   - The coordinate system is relative to the root frame. Top and left coordinates are used.
   - The position of the root renderer is 0,0 and its dimensions are the viewport--—the visible part of the browser window.
   - Layout is a recursive process. It begins at the root renderer, which corresponds to the <html> element of the HTML document. Layout continues recursively through some or all of the frame hierarchy, computing geometric information for each renderer that requires it.
   - All renderers have a "layout" or "reflow" method, each renderer invokes the layout method of its children that need layout.

3. **Dirty bit system**

   - In order not to do a full layout for every small change, browsers use a "dirty bit" system. A renderer that is changed or added marks itself and its children as "dirty": needing layout.
   - There are two flags: "dirty", and "children are dirty" which means that although the renderer itself may be OK, it has at least one child that needs a layout.