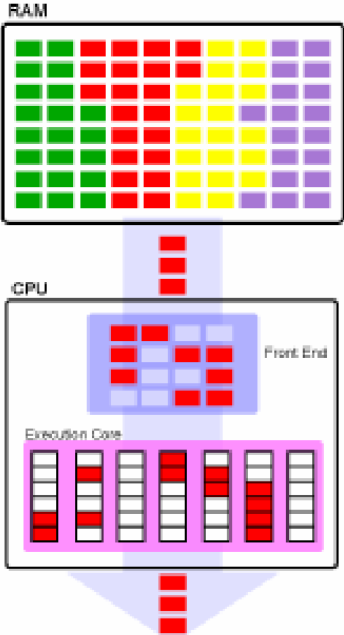
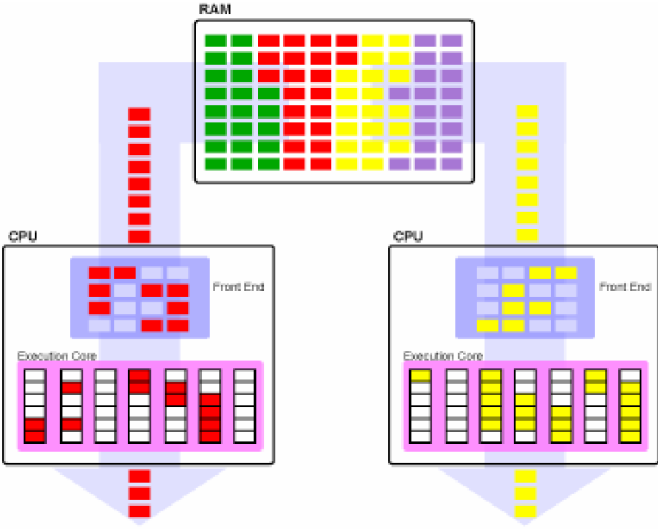


# Introduction to Multithreading, Superthreading and Hyperthreading

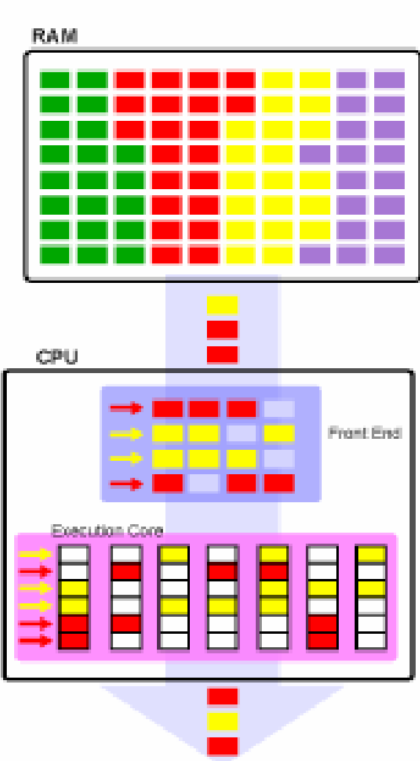
by Jon "Hannibal" Stokes



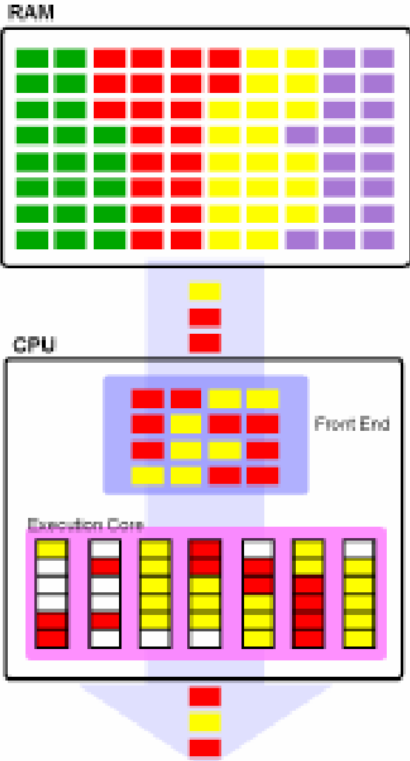
Single-threaded CPU



Single-threaded SMP



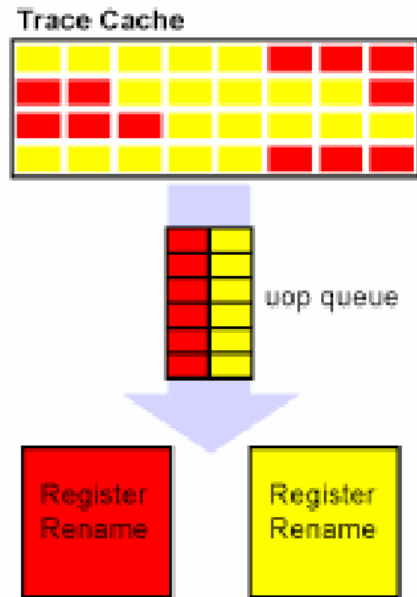
Superthreaded CPU



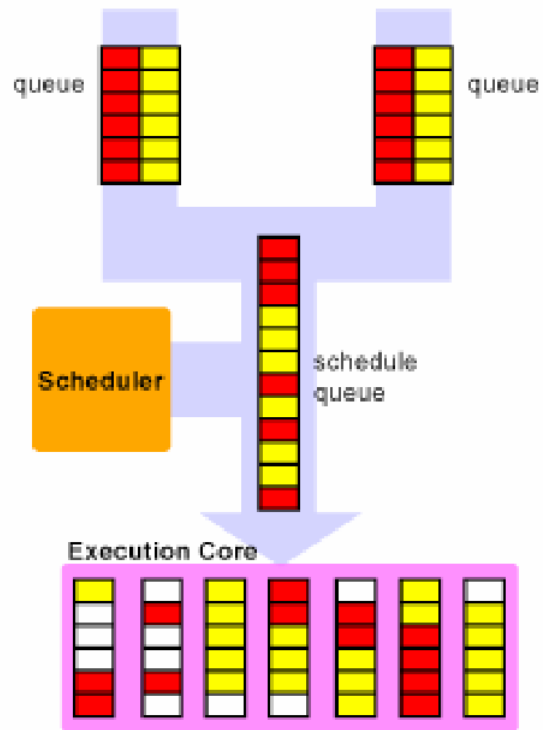
Hyper-threaded CPU

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**Statically Partitioned Queue**



**Dynamically Partitioned Queue**

<b>Replicated</b>	<ul style="list-style-type: none"> <li>• Register renaming logic</li> <li>• Instruction Pointer</li> <li>• ITLB</li> <li>• Return stack predictor</li> <li>• Various other architectural registers</li> </ul>
<b>Partitioned</b>	<ul style="list-style-type: none"> <li>• Re-order buffers (ROBs)</li> <li>• Load/Store buffers</li> <li>• Various queues, like the scheduling queues, uop queue, etc.</li> </ul>
<b>Shared</b>	<ul style="list-style-type: none"> <li>• Caches: trace cache, L1, L2, L3</li> <li>• Microarchitectural registers</li> <li>• Execution Units</li> </ul>