



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Paul H. Lego</b>	<b>Project Number</b> <b>J0912</b>
<b>Project Title</b> <b>How Do Computers Remember?</b>	
<b>Objectives/Goals</b> I wanted to learn how computer memory works, and to build basic computer memory myself. Specifically, I wanted to find a way to make the binary logic to remember a single digit number. I had previously learned that basic computer memory is made up of binary logic called Flip-Flops, so I decided to try to use Flip-Flops to build my basic memory.	
<b>Abstract</b>	
<b>Methods/Materials</b> <ol style="list-style-type: none"><li>1. I researched the binary logic for computer memory and flip flops.</li><li>2. I chose a D Flip-Flop as the logic design for my experiment.</li><li>3. I rewired my BCD to 7-segment display project from last year to make it more simple.</li><li>4. I tested the display and noted that as soon as I changed the input switches, the output LED changed without any delay.</li><li>5. I added logic for 4 D flip-flops and a clock between the input switches and the inputs of the BCD to 7-segment decoder.</li><li>6. I added a push button switch to trigger the clock.</li><li>7. I tested the logic again and finalized the logic diagrams and schematics.</li></ol>	
<b>Results</b> With the D Flip-Flop logic between the input switches and the inputs of the BCD to 7-segment decoder, I observed that, even if I changed the switches, the LED display "remembered" the last number input until I pressed the clock switch to clock the flip-flops.	
<b>Conclusions/Discussion</b> I found that D Flip-Flop logic could be used to make a single bit of basic computer memory and that using four of these Flip-Flops and my BCD to 7-segment decoder and display, my project could "remember" a number until I pressed the clock button.	
<b>Summary Statement</b> My project investigated how computers use binary logic called flip-flops to "remember".	
<b>Help Received</b> My mother helped me with suggestions for how to lay out my display board.	