Fluency with Information Technology

7th Edition

Chapter 20
Iteration Principles
Iteration

• Process of repetition:

  looping through a series of statements to repeat them
### while Loop

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Example</th>
</tr>
</thead>
</table>
| **while** ( < condition > )  
{ 
  <statement(s)>  
} | ① var j = 0;  
  ② while ( j < 3 )  
  {  
    document.write("hi");  
    j = j + 1;  
  }  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
for Loop Syntax and Example

```
for ( < init > ; < condition > ; < increment > )
{
    <statement(s)>
}
```

```
var j;  // 1
for ( j = 0 ; j < 3 ; j++ )  // 2
{
    true  // 3
    document.write("ho");  // 4
}
```

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Table 20.1

**Operations on j: for (j = 0; j < 3; j = j+1)**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Operation Result</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>j = 0</td>
<td>j's value is 0</td>
<td>Initialize iteration variable</td>
</tr>
<tr>
<td>j &lt; 3</td>
<td>true; j is less than 3</td>
<td>First &lt;continuation&gt; test, do statements, continue</td>
</tr>
<tr>
<td>j = j + 1</td>
<td>j's value is 1</td>
<td>First &lt;next iteration&gt; operation</td>
</tr>
<tr>
<td>j &lt; 3</td>
<td>true; j is less than 3</td>
<td>Second &lt;continuation&gt; test, do statements, continue</td>
</tr>
<tr>
<td>j = j + 1</td>
<td>j's value is 2</td>
<td>Second &lt;next iteration&gt; operation</td>
</tr>
<tr>
<td>j &lt; 3</td>
<td>true; j is less than 3</td>
<td>Third &lt;continuation&gt; test, do statements, continue</td>
</tr>
<tr>
<td>j = j + 1</td>
<td>j's value is 2</td>
<td>Third &lt;next iteration&gt; operation</td>
</tr>
<tr>
<td>j &lt; 3</td>
<td>false; j is equal to 3</td>
<td>Fourth &lt;continuation&gt; test, terminate</td>
</tr>
</tbody>
</table>
for Example

text = "She said ";
for (j = 1; j <= 3; j = j + 1) {
    text = text + "Never! ";
}
alert(text);

which produces the following alert box.
for Loop Rules

• Continuation/Termination Test
  – Any expression resulting in a Boolean value
  – Must involve iteration variable to avoid infinite loop

• Step Size
  – Amount of change from one iteration to next
  – Often called increment or decrement