Fundamental of Programming
CSDC101

Henry James Ros **1-BSIS|ZT13AM**

Code

```
for (int i = 1; i <= n; i++){ //outer loop for rows
      for (int j = 1; j <= n; j++) { //inner loop for columns
            cout << i * j;
      if (i * j < 10){
           cout << "   ";
      }else if (i * j < 100){
           cout << "  ";
      }else{
           cout << " ";
            }
      }
            cout << endl; //new line after each row
  }
```

Code tracing

Iteration 1:

Variables:

n = 3

i = 1

j = 1

```
for (int i = 1; 1 <= 3; i++){ // prints 1  2  3
      for (int j = 1; j <= 3; j++) {
            cout << 1 * 1; //j = 1 so 1 * 1, 1 * 2, 1 * 3
      if (i * j < 10){ // Since i * j < 10, it prints three spaces
           cout << "   ";
      }else if (i * j < 100){
           cout << "  ";
      }else{
           cout << " ";
            }
      }
            cout << endl; //new line since 1 <= 3 = true
  }
```

Current output:

```
1   2   3
```

Iteration 2:

Variables:

n = 3

i = 2

j = 1

```
for (int i = 2; 2 <= 3; i++){ //prints 2  4  6
      for (int j = 2; j <= 3; j++) { //j++ every itereation
            cout << 2 * 1; // this becomes 2 * 1, 2 * 2, 2 * 3
      if (i * j < 10){
            cout << "   "; //since i * j < 10, it prints 3 spaces
      }else if (i * j < 100){
            cout << "  ";
      }else{
            cout << " ";
             }
      }
             cout << endl; //new line since 2 <= 3 = true
}
```

Output:

```
1   2   3
2
```

Variables:

n = 3

i = 2

j = 2

```
for (int i = 2; 2 <= 3; i++){ //prints 2  4  6
      for (int j = 2; j <= 3; j++) { //j++ every itereation
            cout << 2 * 2; // this becomes 2 * 1, 2 * 2, 2 * 3
      if (i * j < 10){
            cout << "   "; //since i * j < 10, it prints 3 spaces
      }else if (i * j < 100){
            cout << "  ";
      }else{
            cout << " ";
             }
      }
             cout << endl; //new line since 2 <= 3 = true
}
```

Output:

```
1   2   3
2   4
```

Variables:

```
n = 3
i = 2
j = 3

for (int i = 2; 2 <= 3; i++){ //prints 2  4  6
      for (int j = 2; j <= 3; j++) { //j++ every itereation
            cout << 2 * 3; // this becomes 2 * 1, 2 * 2, 2 * 3
      if (i * j < 10){
           cout << "   "; //since i * j < 10, it prints 3 spaces
      }else if (i * j < 100){
           cout << "  ";
      }else{
           cout << " ";
            }
      }
            cout << endl; //new line since 2 <= 3 = true
}

Total output:
1   2   3
2   4   6


Iteration 3:
Variables:
n = 3
i = 3
j = 1

for (int i = 3; i <= 3; i++){//print 3  6  9
      for (int j = 3; j <= 3; j++) { //j++ every iteration
            cout << 3 * 1; // this become 3 * 1, 3 * 2, 3 * 3
      if (i * j < 10){
           cout << "   ";
      }else if (i * j < 100){ //since i * j < 10, it print 3 spaces
           cout << "  ";
      }else{
           cout << " ";
            }
      }
            cout << endl; //3 <= 3 = true, prints new line
  }

Output:
1   2   3
2   4   6
3
```

Variables:
n = 3
i = 3
j = 2

```
for (int i = 3; i <= 3; i++){//print 3  6  9
      for (int j = 3; j <= 3; j++) { //j++ every iteration
            cout << 3 * 1; // this become 3 * 1, 3 * 2, 3 * 3
      if (i * j < 10){
           cout << "   ";
      }else if (i * j < 100){ //since i * j < 10, it print 3 spaces
           cout << "  ";
      }else{
           cout << " ";
            }
      }
            cout << endl; //3 <= 3 = true, prints new line
  }
```

Output:

```
1   2   3
2   4   6
3   6
```

Variables:
n = 3
i = 3
j = 3

```
for (int i = 3; i <= 3; i++){//print 3  6  9
      for (int j = 3; j <= 3; j++) { //j++ every iteration
            cout << 3 * 3; // this become 3 * 1, 3 * 2, 3 * 3
      if (i * j < 10){
           cout << "   ";
      }else if (i * j < 100){ //since i * j < 10, it print 3 spaces
           cout << "  ";
      }else{
           cout << " ";
            }
      }
            cout << endl; //3 <= 3 = true, prints new line
  }
```

Total output:

```
1   2   3
2   4   6
3   6   9
```

Iteration 4:
Variables:
n = 3
i = 4
j = 3

```
for (int i = 3; 4 <= 3; i++){//Iterates againm but 4 <= 3 = false
      for (int  = 3; j <= 3; j++) {
            cout << 3 * j;
      if (i * j < 10){
           cout << "   ";
      }else if (i * j < 100){
           cout << "  ";
      }else{
           cout << " ";
            }
      }
            cout << endl; //4 <= 3 = false, Line stops
  }
```

Final output:

```
1   2   3
2   4   6
3   6   9
```