Four Key Ingredients of a Loop

(initialisation)
(condition)
(body)
(incrementation)

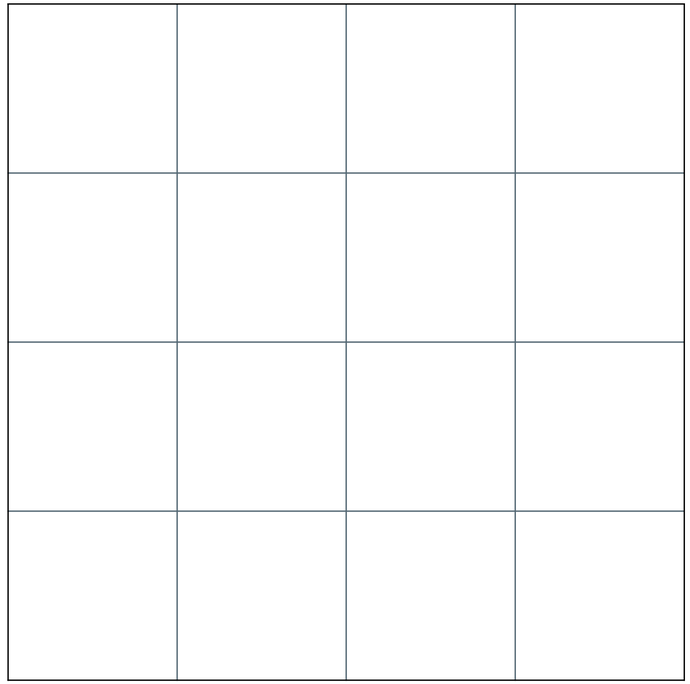
```
int counter = 1
while (counter <= 10) {
    printf("%d\n", counter);
    counter = counter + 1;
}
```

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

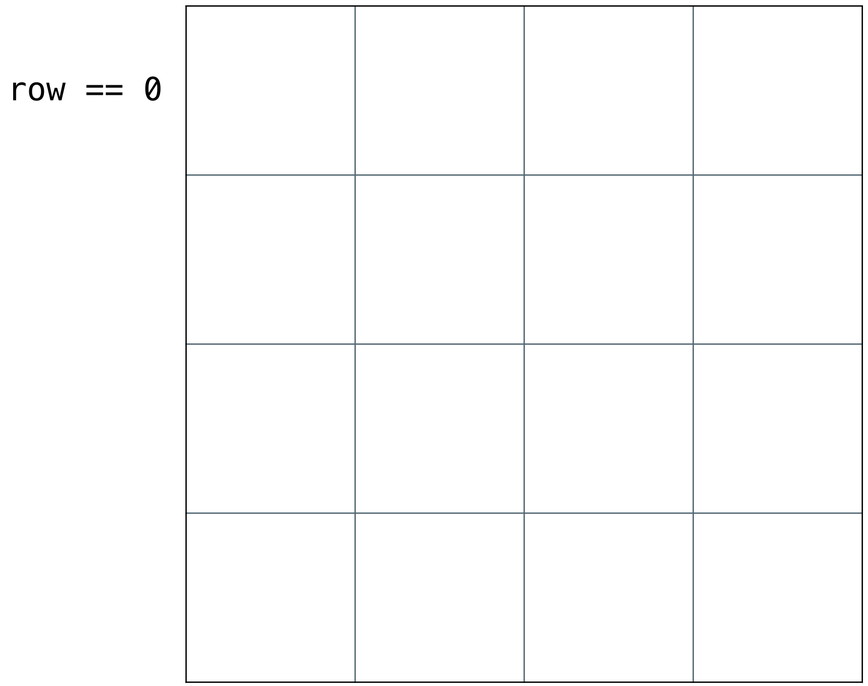


Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

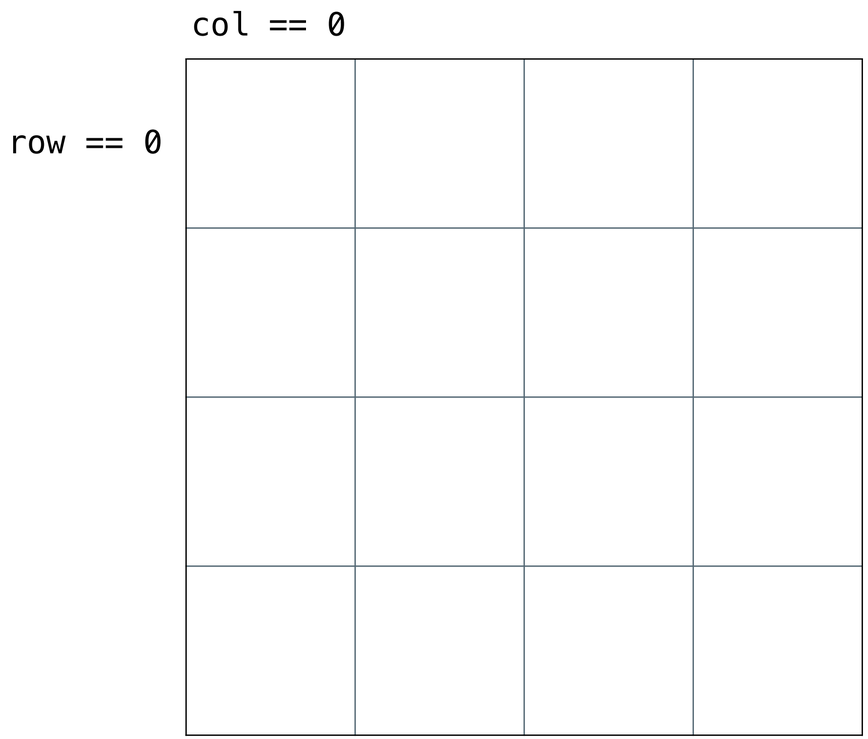


Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

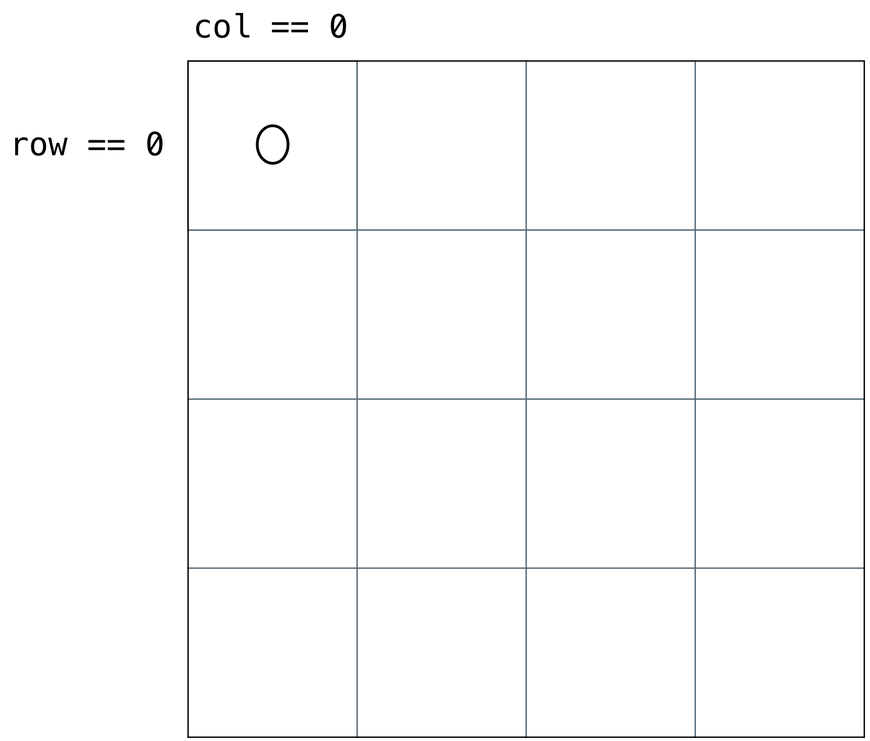


Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

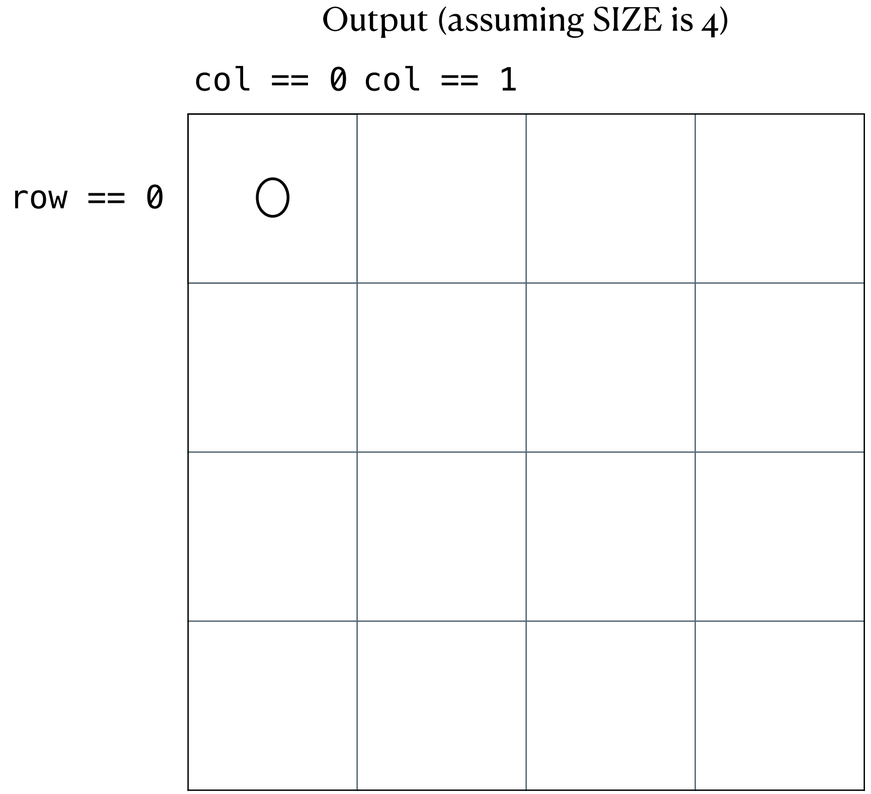


Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

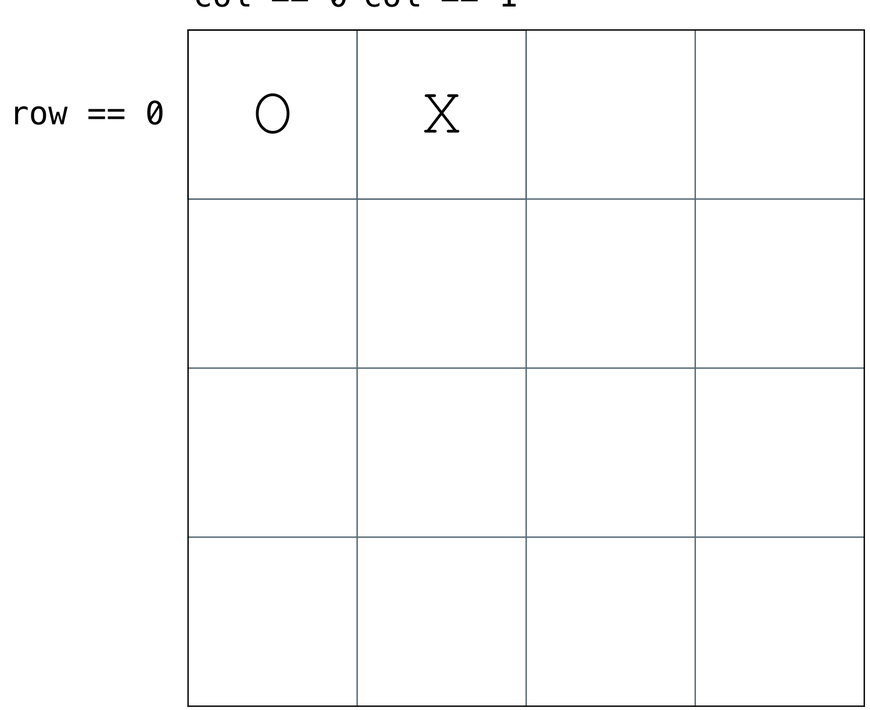


Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)



Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	
row == 0	O	X		

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	
row == 0	O	X	X	

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

row == 0	O	X	X	X
row == 1				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0			
row == 0	O	X	X	X
row == 1				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0			
row == 0	O	X	X	X
row == 1	X			

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1		
row == 0	O	X	X	X
row == 1	X			

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1		
row == 0	O	X	X	X
row == 1	X	O		

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	
row == 0	O	X	X	X
row == 1	X	O		

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	
row == 0	O	X	X	X
row == 1	X	O	X	

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1	X	O	X	

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1	X	O	X	X

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0			
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0			
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X			

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1		
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X			

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1		
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X		

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X		

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0			
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3				

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0			
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3	X			

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1		
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3	X			

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1		
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3	X	X		

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3	X	X		

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3	X	X	X	

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3	X	X	X	

Example 2D Loop

Thinking like the computer

```
int row = 0;
while (row < SIZE) {
    int col = 0;
    while (col < SIZE) {
        if (row == col) {
            printf("O");
        } else {
            printf("X");
        }
        col = col + 1;
    }
    printf("\n");
    row = row + 1;
}
```

Output (assuming SIZE is 4)

	col == 0	col == 1	col == 2	col == 3
row == 0	O	X	X	X
row == 1	X	O	X	X
row == 2	X	X	O	X
row == 3	X	X	X	O