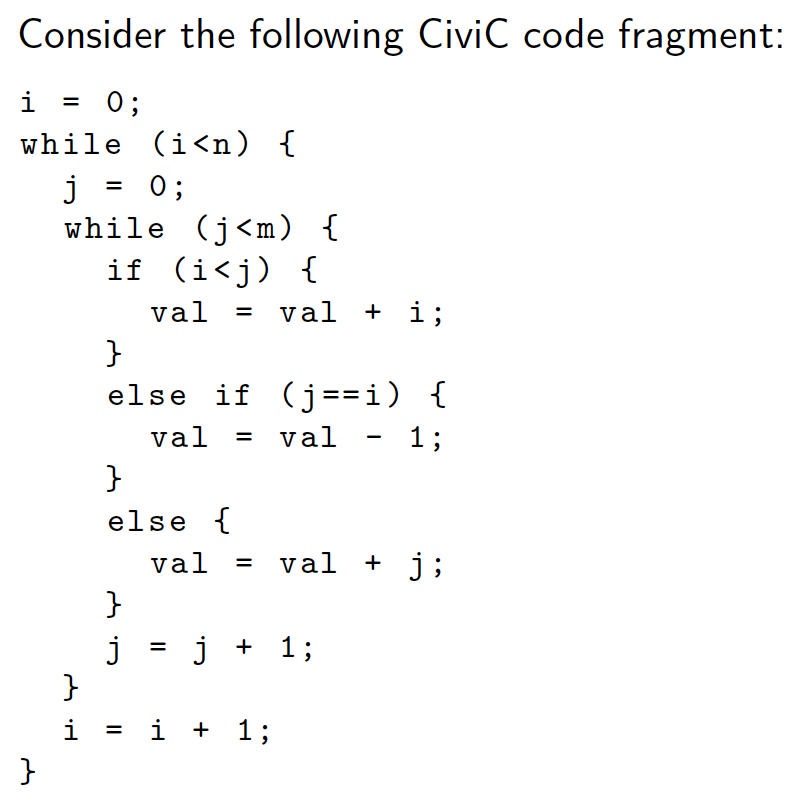
**Assignment Series 5**

Code Transformation and Optimisation

Andrea & Aynel



**Assignment 18: Static Single Assignment Form**

i\_0 = 0;  
p\_0 = i\_0 < n;  
  
while ( phi(p\_0, p\_1) )  
{

j\_0 = 0;  
 q\_0 = j\_0 < m;  
  
 while( phi(q\_0, q\_1) )  
 {

i\_1 = phi(i\_0, i\_2);

j\_1 = phi(j\_0, j\_2);

val\_4 = phi(val\_1, val\_2, val\_3);

val\_5 = phi(val\_0, val\_4);

if (i\_1 < j\_1) {  
 val\_1 = val\_5 + i\_1;

} else if (j\_1 == i\_1) {

val\_2 = val\_5 - 1;

} else {

val\_3 = val\_5 + j\_1;

}

j\_2 = j\_1 + 1;  
 q\_1 = j\_2 < m;

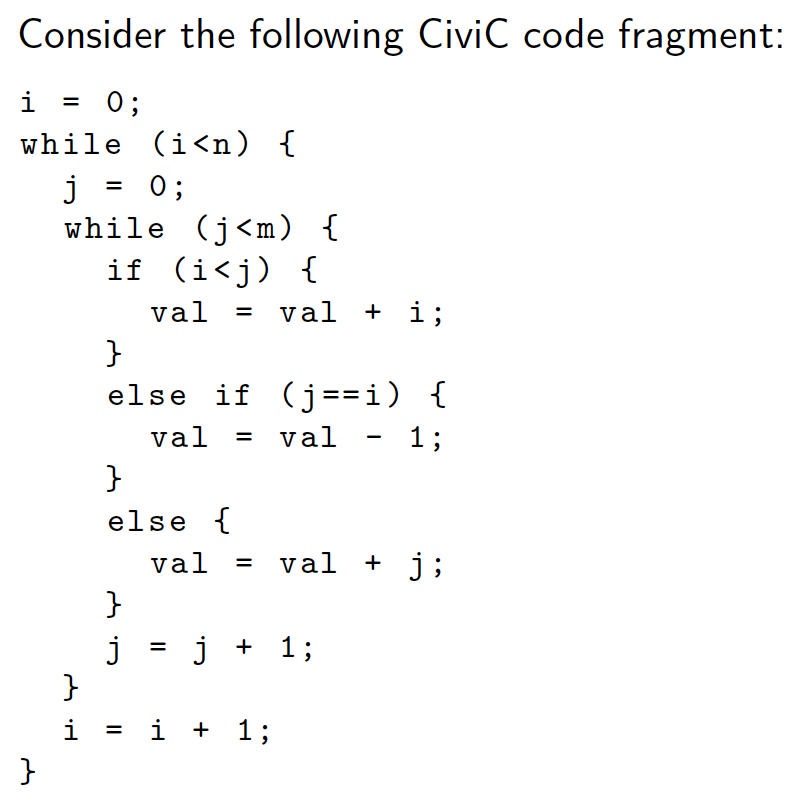
}

i\_2 = i\_1 + 1;

p\_1 = i\_2 < n;

}

**Assignment 19: Machine-Independent Optimisation**



After loop-unrolling:  
  
i = 0;  
while (i < n) {  
 j = 0;

if (i < j ) {  
 while (j < m ) {  
 val += i;  
 j += 1;  
 }  
 }  
   
 if ( j == i ) {  
 while (j < m) {  
 val -= 1;  
 j += 1;  
 }  
 }  
  
 if (i > j) {  
 while (j < m) {  
 val += j;  
 j += 1;  
 }  
 }  
  
 i += 1;  
}

Of omgeschreven naar for loops:

for (int i = 0; i < n; i++) {

for (int j = 0; j < i; j++) {

val += j;

}

val -= 1;

for (j = i + 1; j < m; j++) {

val += i;

}

}

**Assignment 20: Compilation Scheme**

Original:

| while (condition) { |

C | *Body* |

| } |

| *Rest* |

Replacement:

| if (condition) { |

-> | do { |

| C|*Body*| |

| } while (condition) |

| } |

| C|*Rest|* |