

Chapter 10

Programming in C

Lesson 04

Program flow Control Structures- Loops, Decisions and Control Structure Constructs

Loop

- Has a set of statements in curly brackets that execute from first statement to last
- Firstly the value(s) or condition(s) to be used in the loop initialised
- Initialisation before a condition test for running the loop

Loop

- At the end of the loop (last statement), the value(s) or condition(s) changed
- The loop starts again if *looping condition* is true
- Else the program flows to the next statement just after the loop

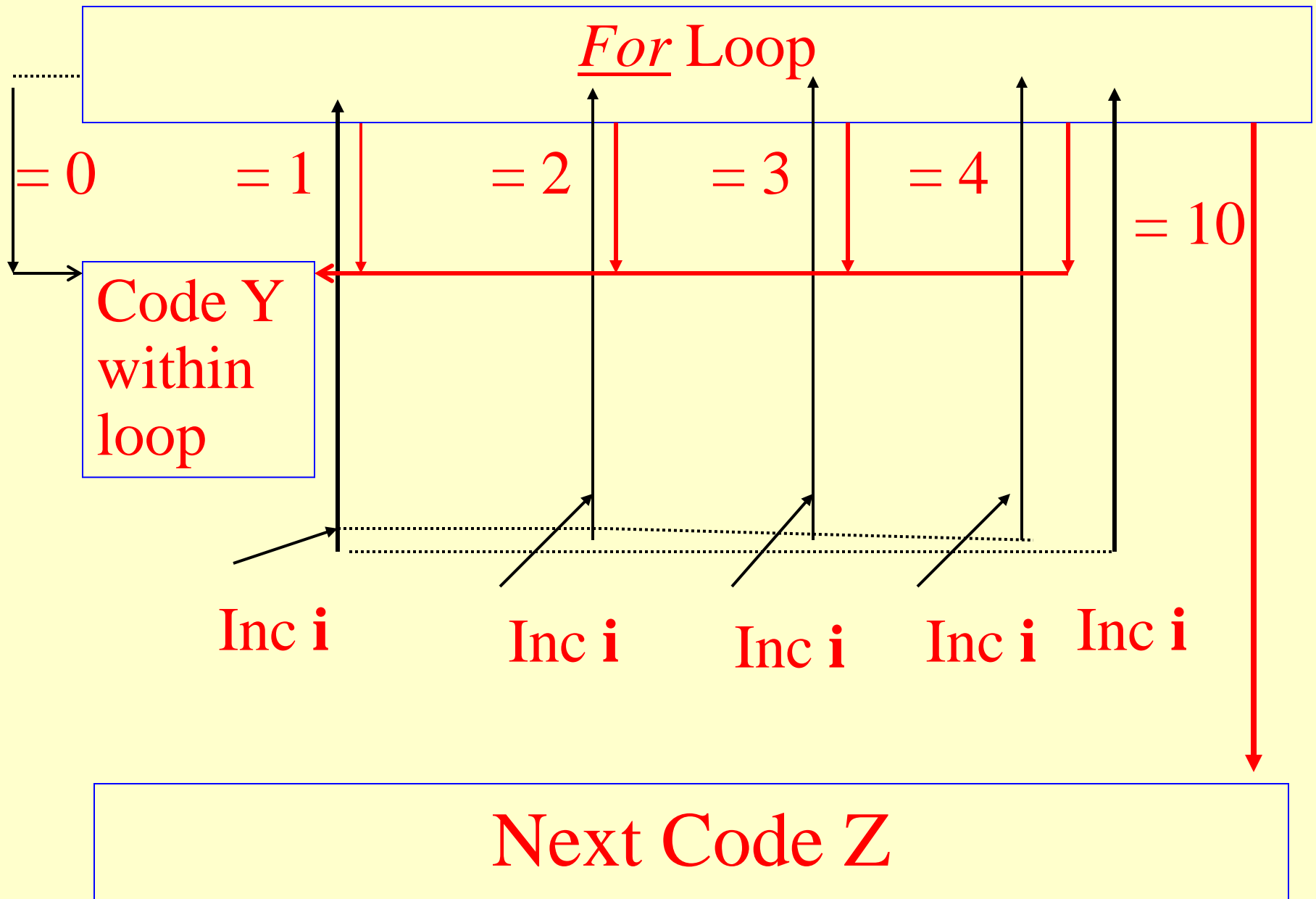
initial setting of loop
variable i

change of i at loop end

For loop example

- for ($i = 0; i > 9; i = i+1$)
 {Y};
- Z;

loop breaking condition



For Loop Example

- `n = 20; sum = 0; for (i = 0, i < n, i++) { sum = sum + array [i]; }; /*are the statements for finding sum of the n -terms in the array, array [i] with $i = 0$ to $n-1$ */`

initial setting of loop variable i

i change at loop end

For loop example

- for ($i = 0$; $i > 9$; $i = i + 1$)
 { sum = sum + amount [i]; }
- sumperc = 100 * sum / total;

loop breaking condition

expr variable change within loop

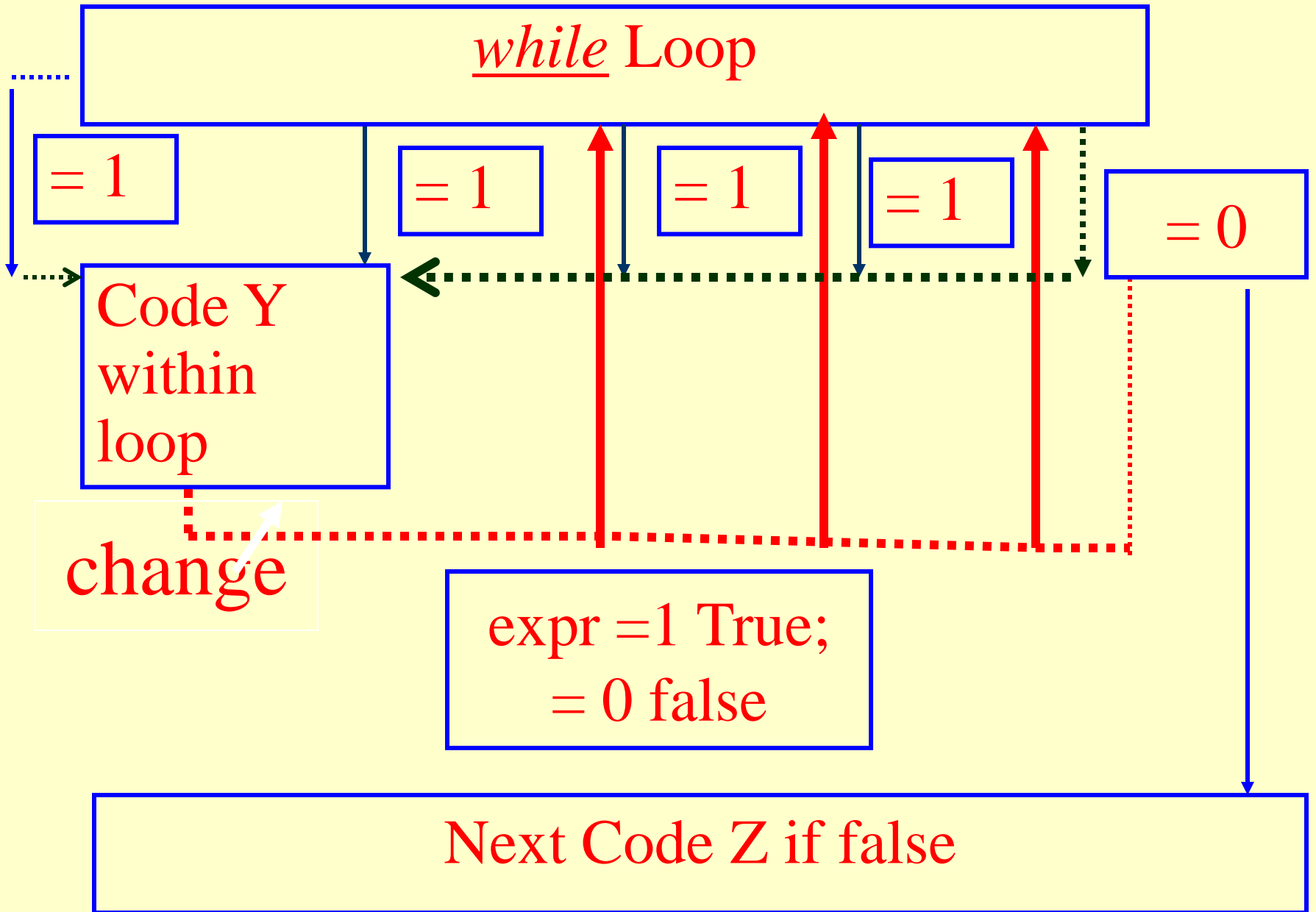
while loop example

- while (expr) {Y;}
- Z;

test looping
condition

loop on true and exit loop
when expr = false

while Loop



While loop Example

- `n = 20; sum = 0; i = 0; while (i < n) {sum = sum + array [i]; i++};` /*are the statements for finding sum of the N -terms in the array, array [i] with $i = 0$ to $N-1$ */

expr variable change within loop

while loop example

- while ($i < 10$) {sum = sum + amount [i]; i++;}
- sumperc = 100*

test looping condition

loop on true and exit loop when expr = false

expr variable change within loop

repeat until loop example

- repeat {*Y*} until (*expr*);
- *Z*;

repeat *Y* on *expr* = true and exit loop when *expr* = false

test exit loop condition

expr variable change within loop

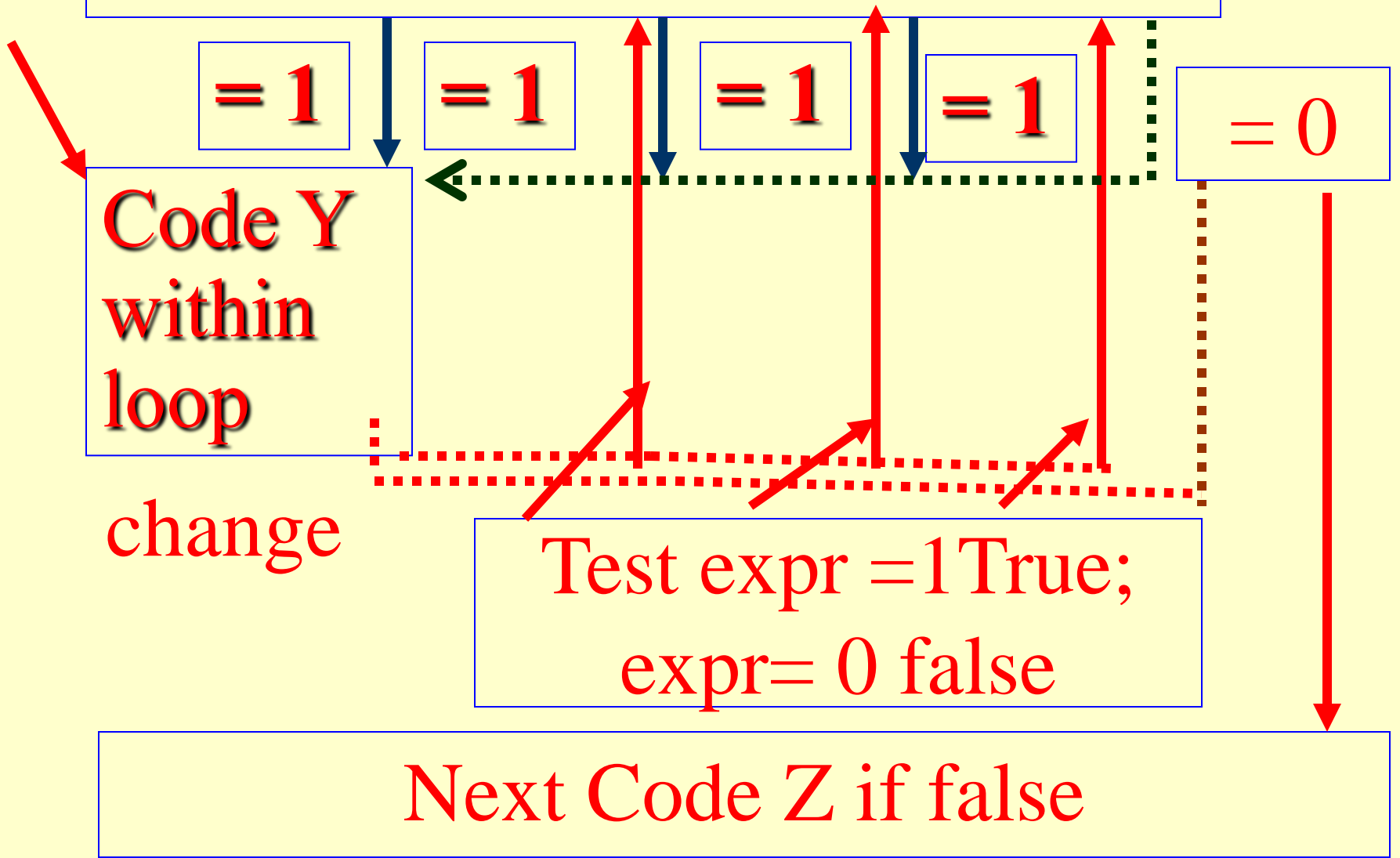
$i = 0; repeat \{Y; i++;\}$ until $(i > 9);$

- $Z;$

On test true, exit
loop

repeat Y on $expr = true$ and
exit loop when $expr = false$

repeat until Loop



Repeat Loop Example

- $n = 20$; $sum = 0$; $i = 0$; Repeat { $sum = sum + array[i]$; $i++$; } Until { $i < n$ }; /*are the statements for finding sum of the N -terms in the array, array $[i]$ with $i = 0$ to $N-1$ */

If (arithmetic expression)

< 0

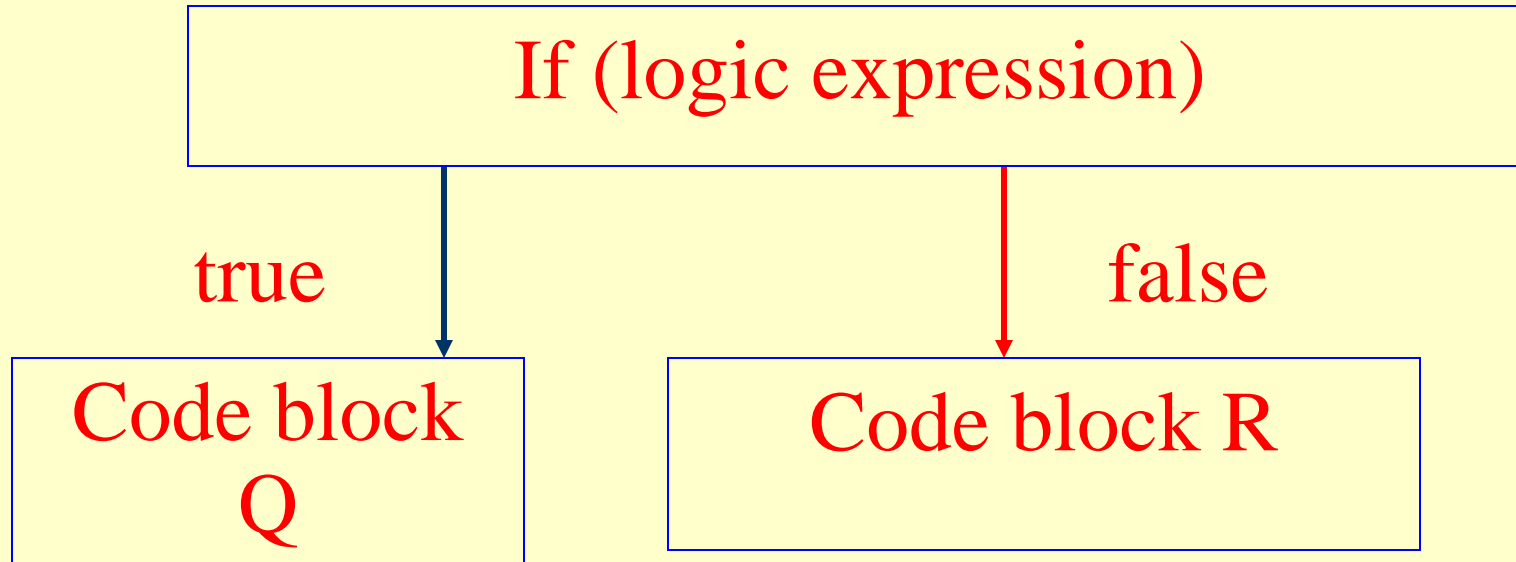
Code
block N

$= 0$

Code block
O

> 0

Code
block P



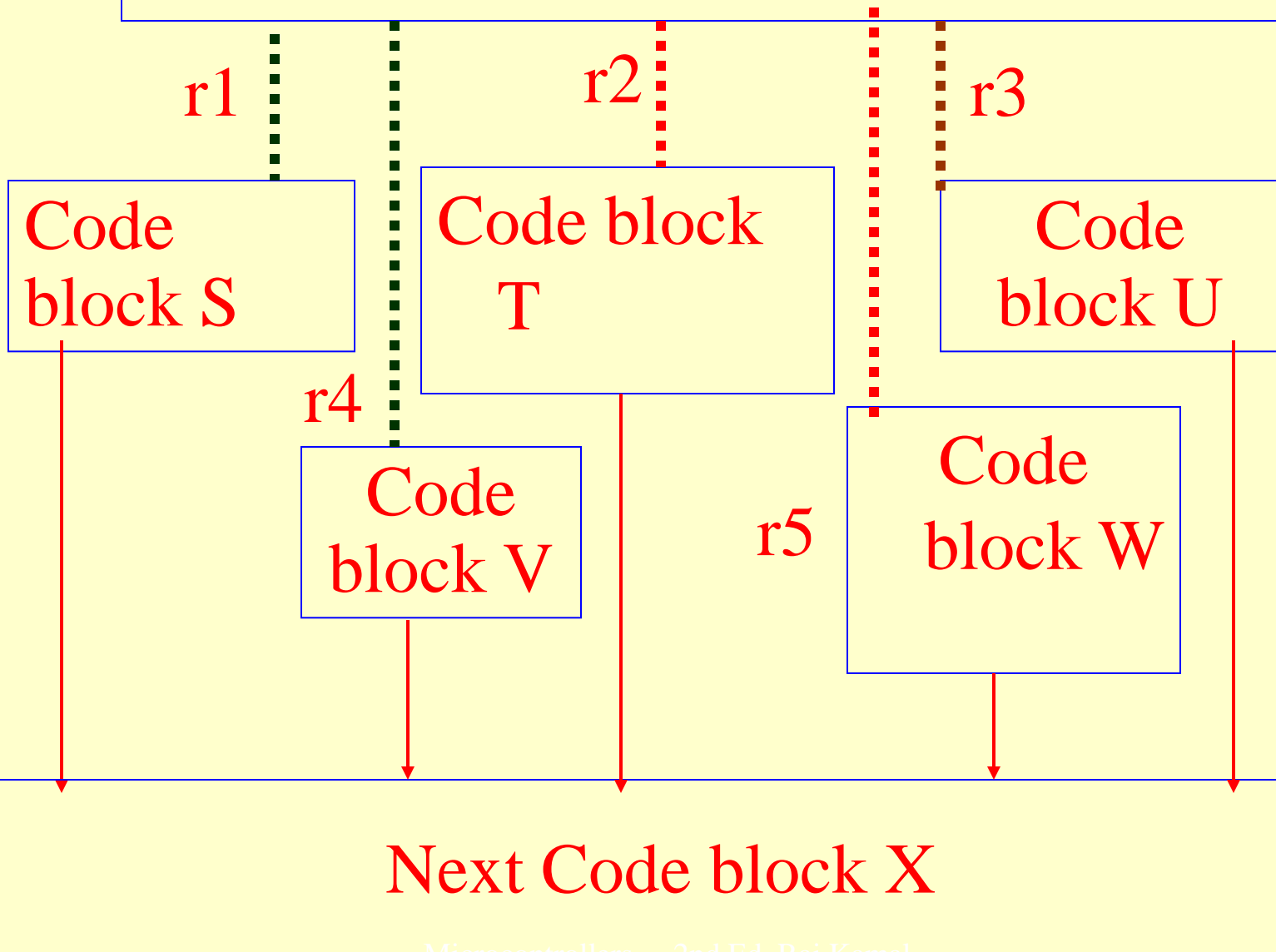
Case branching

- `case (expr){
r1 {S; break;};r2{T;break;};
r3{U;break;}; r4{ V;break;};
r5{ W;break;};}`
- `X;`

N-way branching

- If (expr = r1) then S else if (expr = r2) then T else if (expr = r3) then U else if (expr = r4) then V else if (expr = r5) then W;
- X;

Case (arithmetic expression)



Summary

We learnt

Loops

- for
- while
- repeat until

We learnt

Decision block

- If then ... decision block
- If then ... else decision block
- If then .. else if decision block
- If then decision else if .. else if ..
decision block for N-way branching

We learnt

Case Statement

- Case (expr) {.....} for N-way branching

End of Lesson 04 on

Program flow Control Structures-
Loops, Decisions and Control Structure
Constructs