Iteration (1A)

Please send corrections (or suggestions) to youngwlim@hotmail.com.

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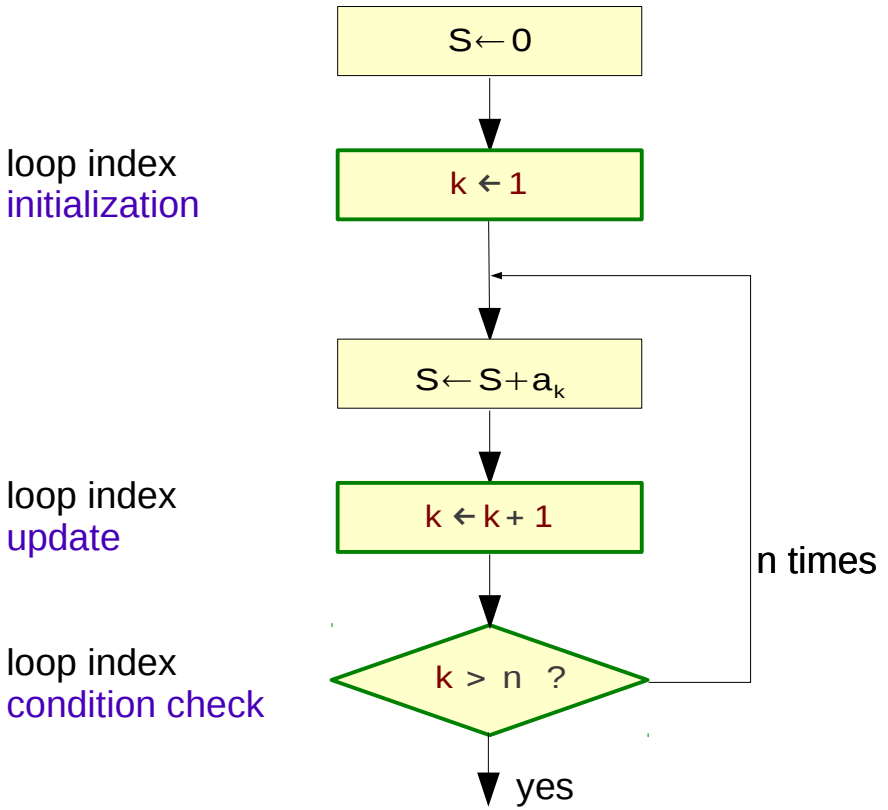
Sigma Notation and Flow Chart

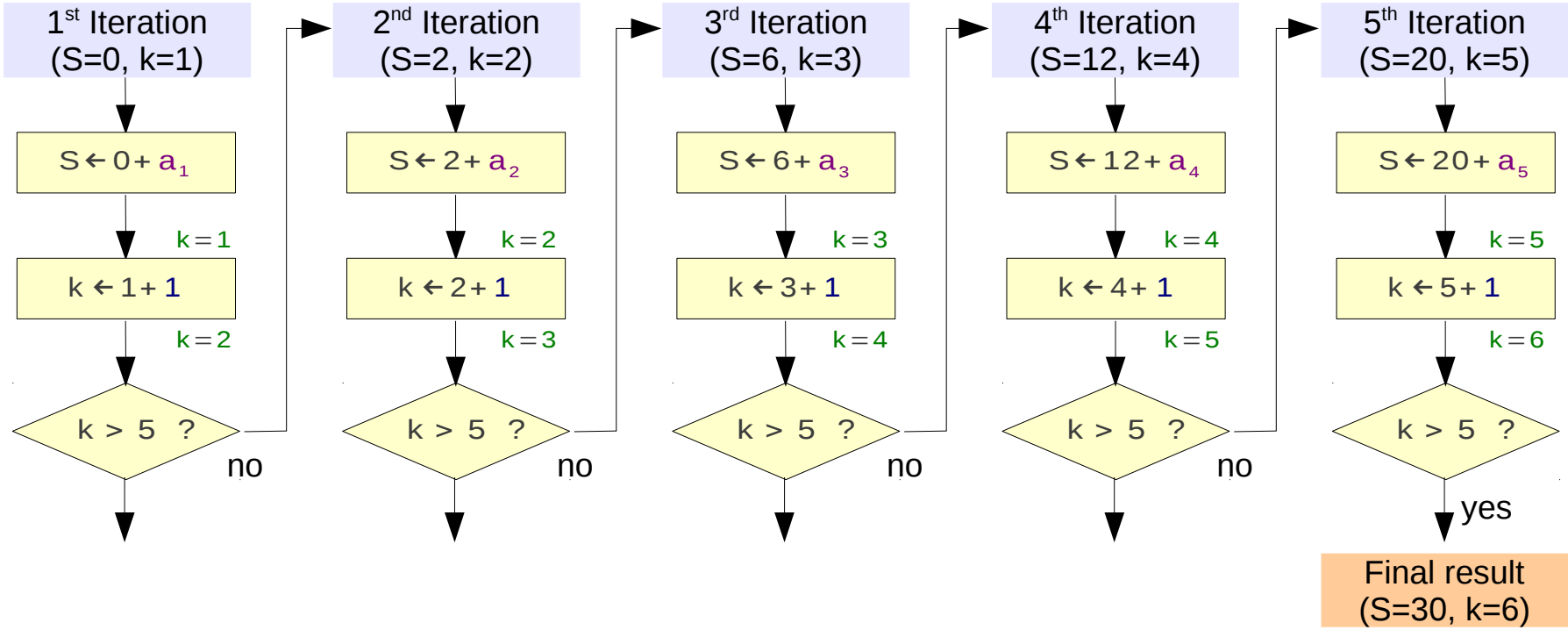
$$S_n = \sum_{k=1}^{n} a_k$$

$$= a_1 + a_2 + a_3 + \cdots + a_n$$



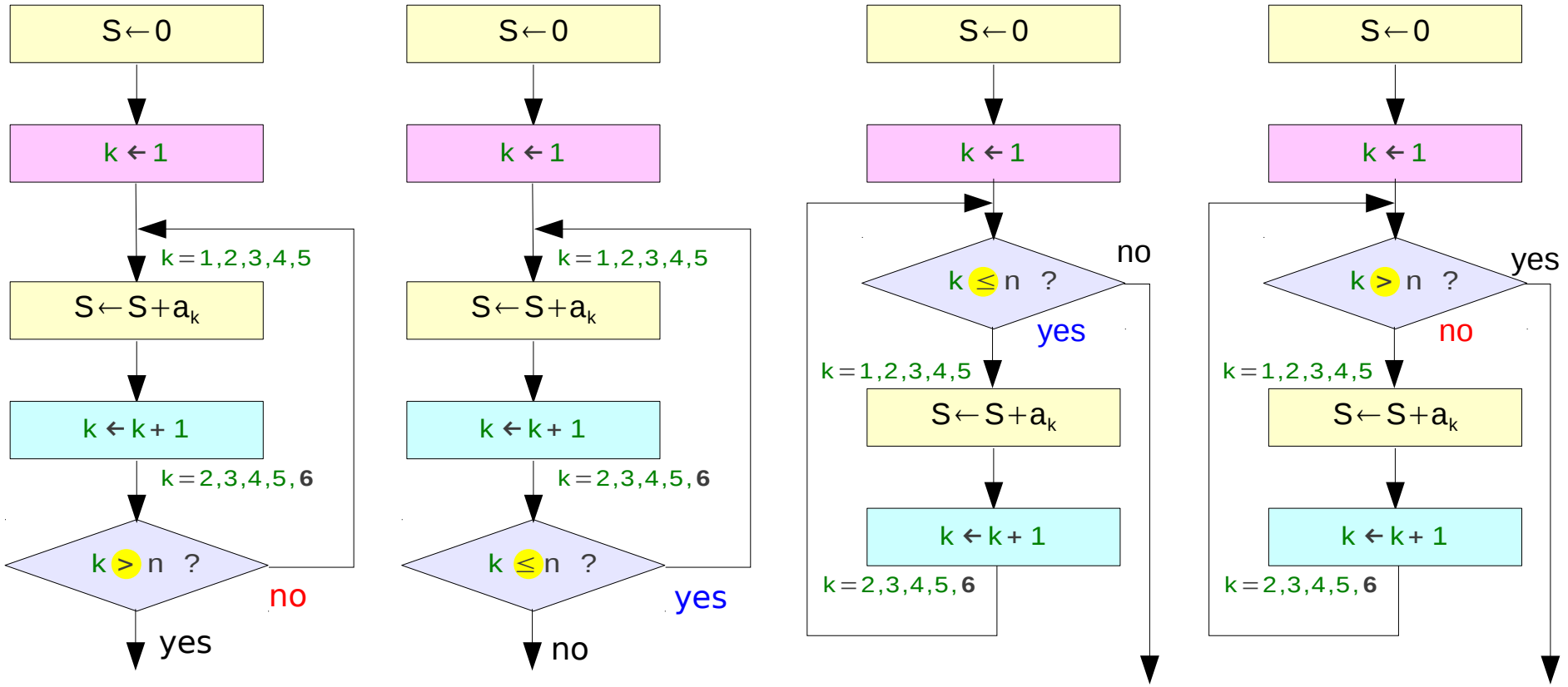
$a_1 = 2,$
$a_2 = 4,$
$a_3 = 6,$
$a_4 = 8,$
$a_5 = 10$

Loop Unrolling

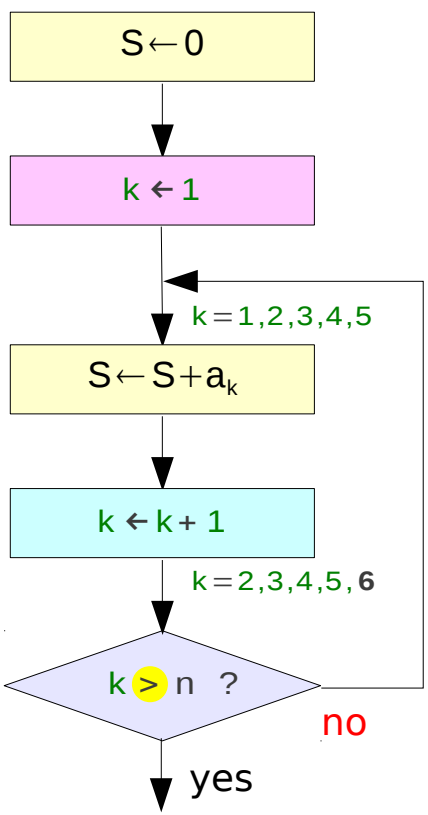


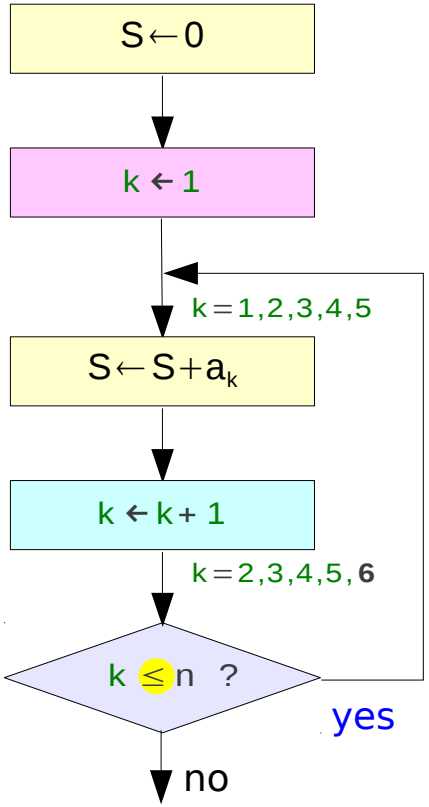
$a_1 = 2,$
$a_2 = 4,$
$a_3 = 6,$
$a_4 = 8,$
$a_5 = 10$

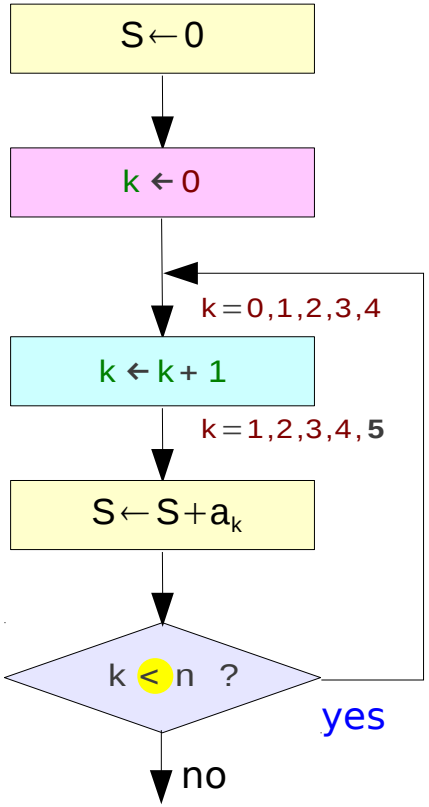
Check Condition

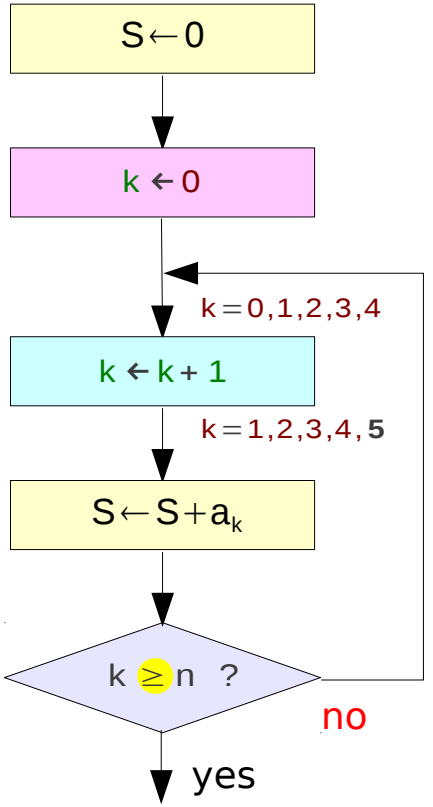


Initial Condition

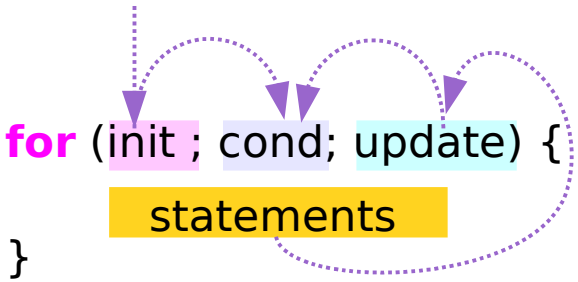






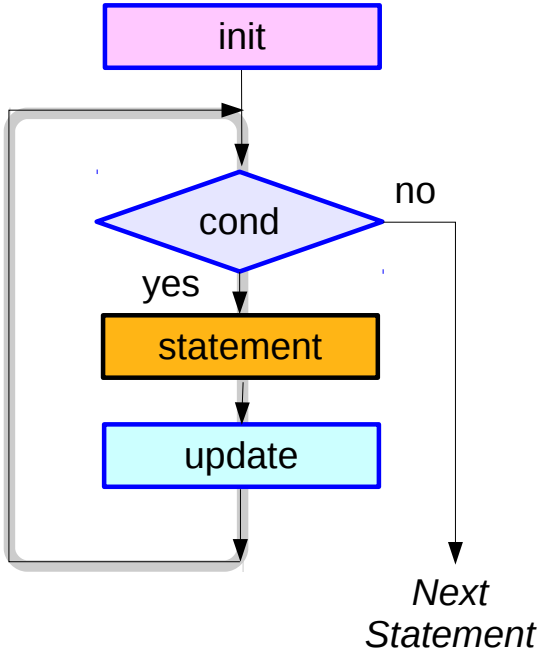


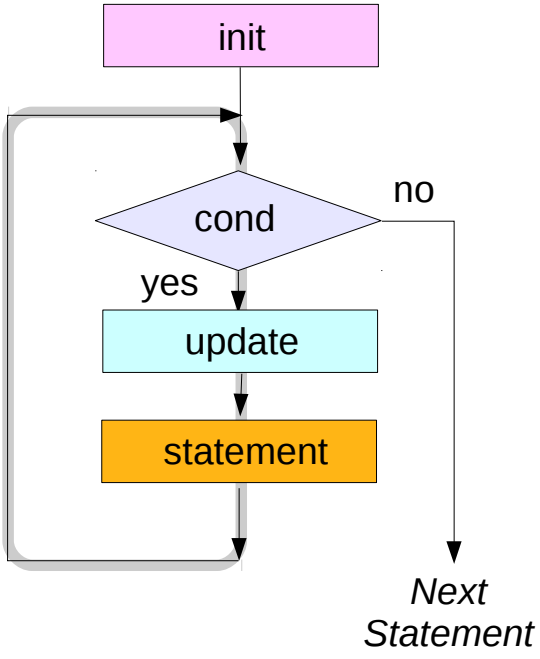
Loop Statements

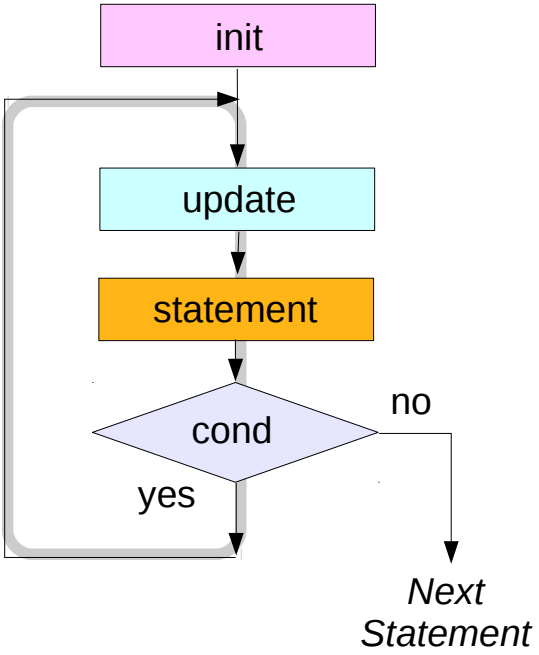



```
init
while (cond) {
  update
  statements
}
```

```
init
do {
  update
  statements
} while (cond);
```



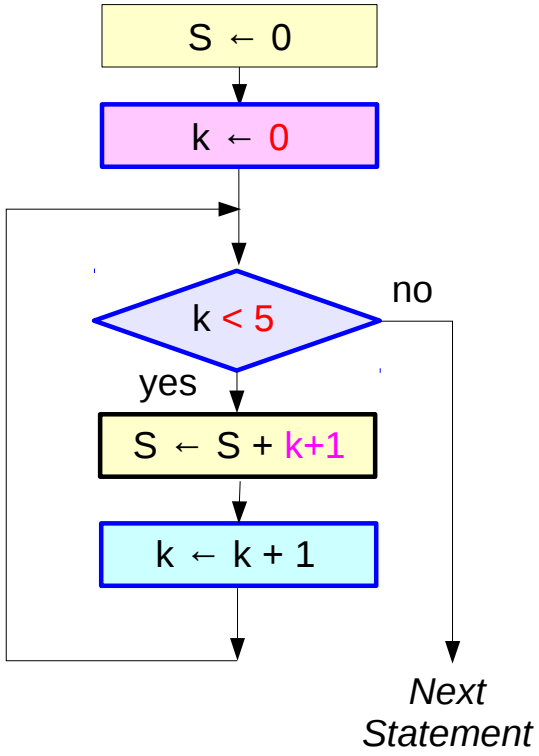




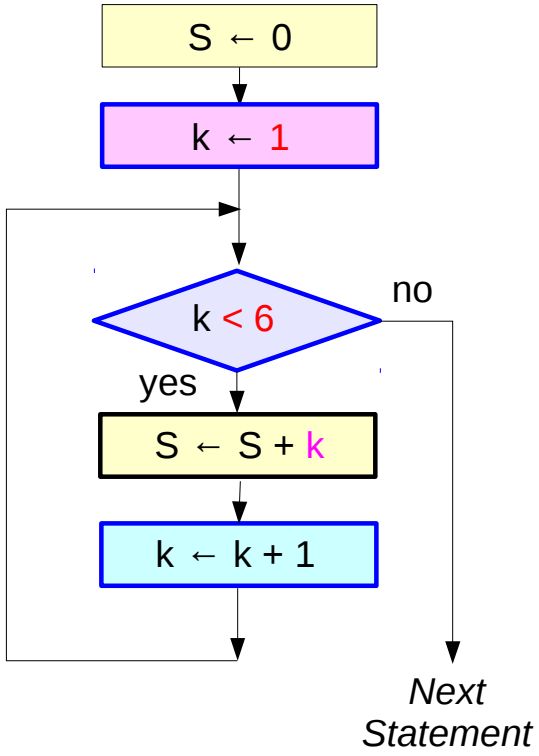
for loop

```
S = 0;
for (k=0; k<5; k++) {
        S = S + k+1;
}
```

```
S = 0;
for (k=1; k<6; k++) {
        S = S + k;
}
```



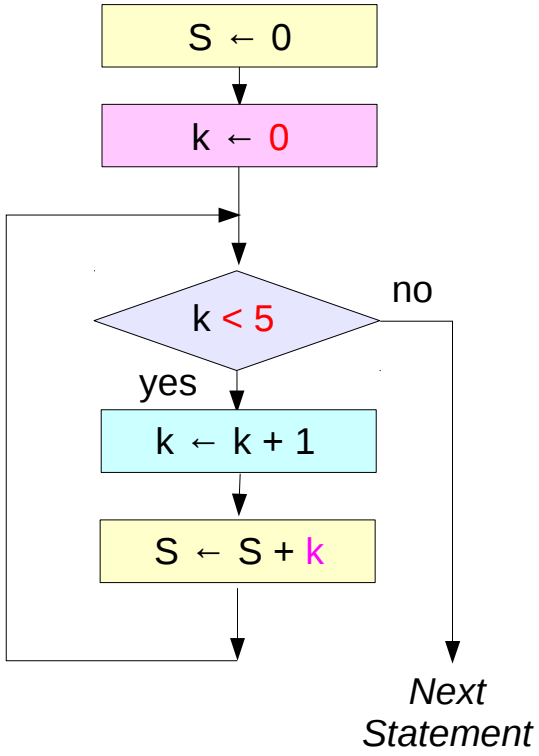
fixed



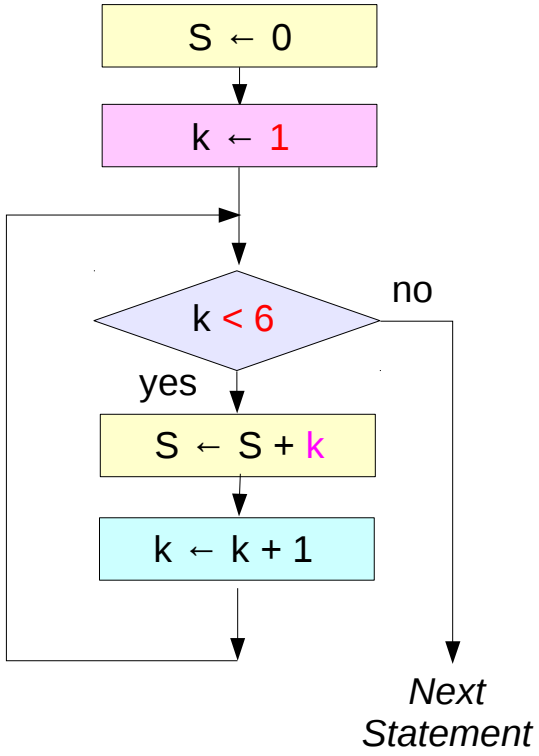
while loop

```
S = 0; k=0;
while (k<5) {
      k = k+1;
      S = S+k;
}
```

```
S = 0; k=1;
while (k<6) {
      S = S+k;
      k = k+1;
}
```



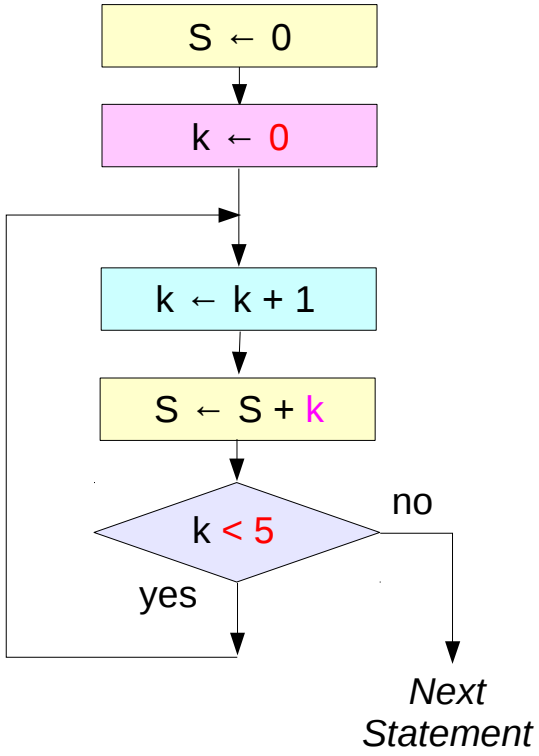
flexible



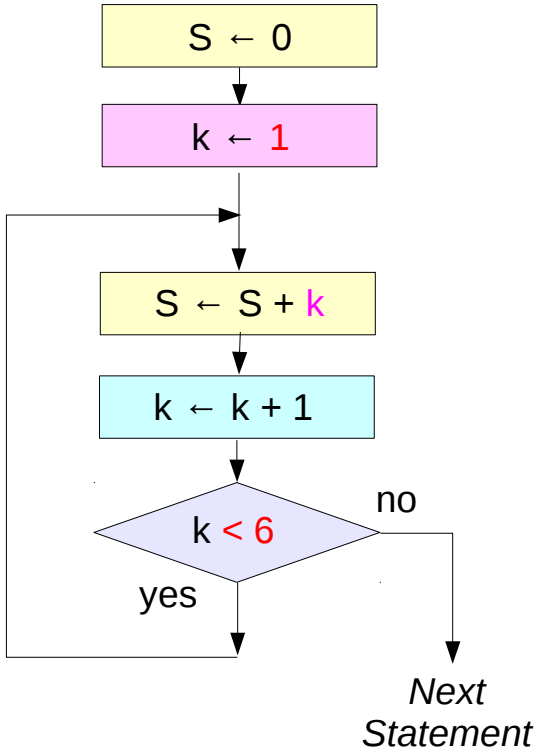
do-while loop

```
S = 0; k=0;
do  {
      k = k+1;
      S = S+k;
} while (k<5);
```

```
S = 0; k=1;
do {
      S = S+k;
      k = k+1;
} while (k<6);
```



flexible,
at least
once



Nested For Loop Examples

```
for (i=0; i<3; ++i)
printf("St1 \n");
for (j=0; j<4; ++j)
printf("St2 \n");
printf("St3 \n");
```

```
for (i=0; i<3; ++i) {
printf("St1 \n");
for (j=0; j<4; ++j)
printf("St2 \n"); }
printf("St3 \n");
```

```
for (i=0; i<3; ++i)
printf("St1 \n");
for (j=0; j<4; ++j) {
printf("St2 \n");
printf("St3 \n"); }
```

```
for (i=0; i<3; ++i)
        printf("St1 \n");
for (j=0; j<4; ++j)
        printf("St2 \n");
printf("St3 \n");
```

```
for (i=0; i<3; ++i) {
        printf("St1 \n");
        for (j=0; j<4; ++j)
                printf("St2 \n");
}
printf("St3 \n");
```

```
for (i=0; i<3; ++i)
        printf("St1 \n");
for (j=0; j<4; ++j) {
        printf("St2 \n");
        printf("St3 \n");
}
```

References

[1] Essential C, Nick Parlante
[2] Efficient C Programming, Mark A. Weiss
[3] C A Reference Manual, Samuel P. Harbison & Guy L. Steele Jr.
[4] C Language Express, I. K. Chun