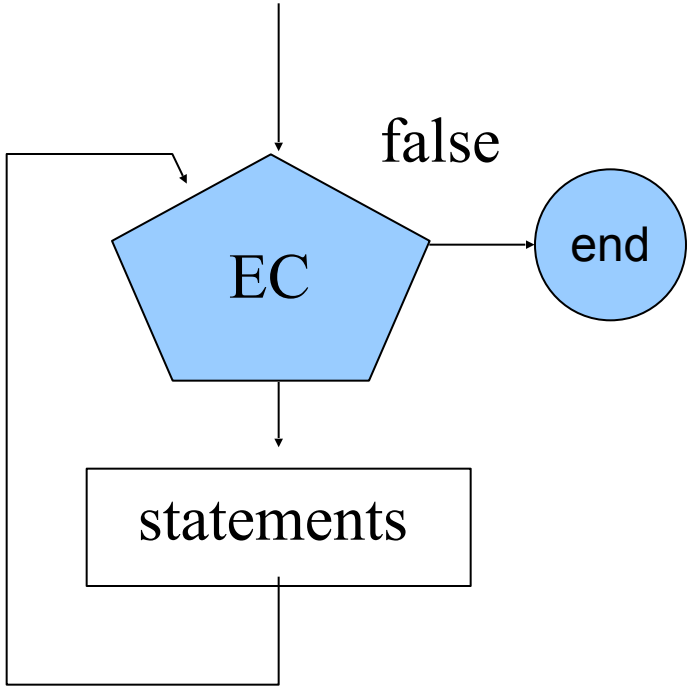
Lecture 6II While-Loop programming

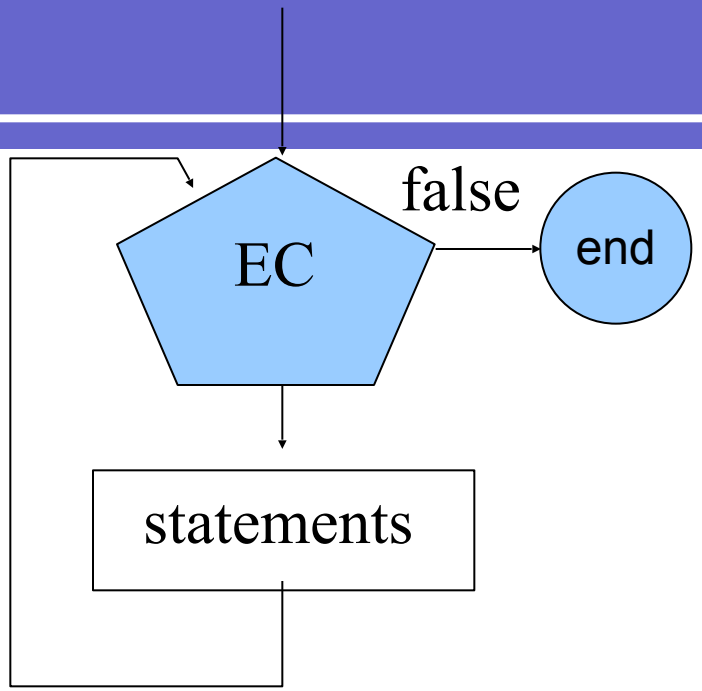
- While-loop flow chart
- Decimal to binary representations

While loop

```
while entry_condition
        statements;
end
```



Flow chart



- Execute body statements repeatedly until the entry condition fails
- The entry condition should eventually become false by iteratively executing body statements

Decimal to binary representations

- Input : positive decimal numbers
- Output : binary representations of the input

Mod

```
>> r=mod(10,3)

ans =

     1

>> q=(10-r)/3

ans =

     3
```

Quotient

```
>> r=mod(100,7)

ans =

     2

>> q=(100-r)/7

ans =

    14
```

Decimal to binary representation

- Let M be a positive decimal number
- Let b be an array of length n

$$b = [b_n, \ldots, b_2, b_1]$$

$$\text{where } b_n > 0$$

- b denotes the binary representation of M if

$$\mathrm{M} = b_n 2^{n-1} + b_{n-1} 2^{n-2} + \ldots + b_1 2^0$$

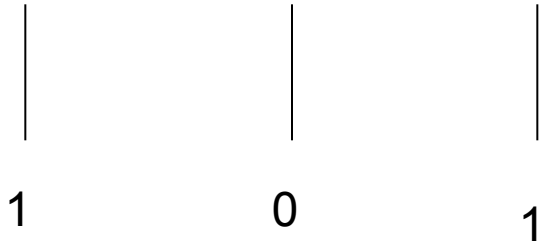
$$\mathrm{C} = \text{'} b_n b_{n-1} \ldots b_1 \text{'}$$

Example

- M > 0
- M=1, b_1=1
- M=5, C='101'

$$b = [b_3, b_2, b_1]$$

$$M = b_3 2^2 + b_2 2^1 + b_1 2^0$$



Example

- M=25, C: '11001' $b = [b_5, b_4, b_3, b_2, b_1]$

$$M = b_5 2^4 + b_4 2^3 + b_3 2^2 + b_2 2^1 + b_1 2^0$$

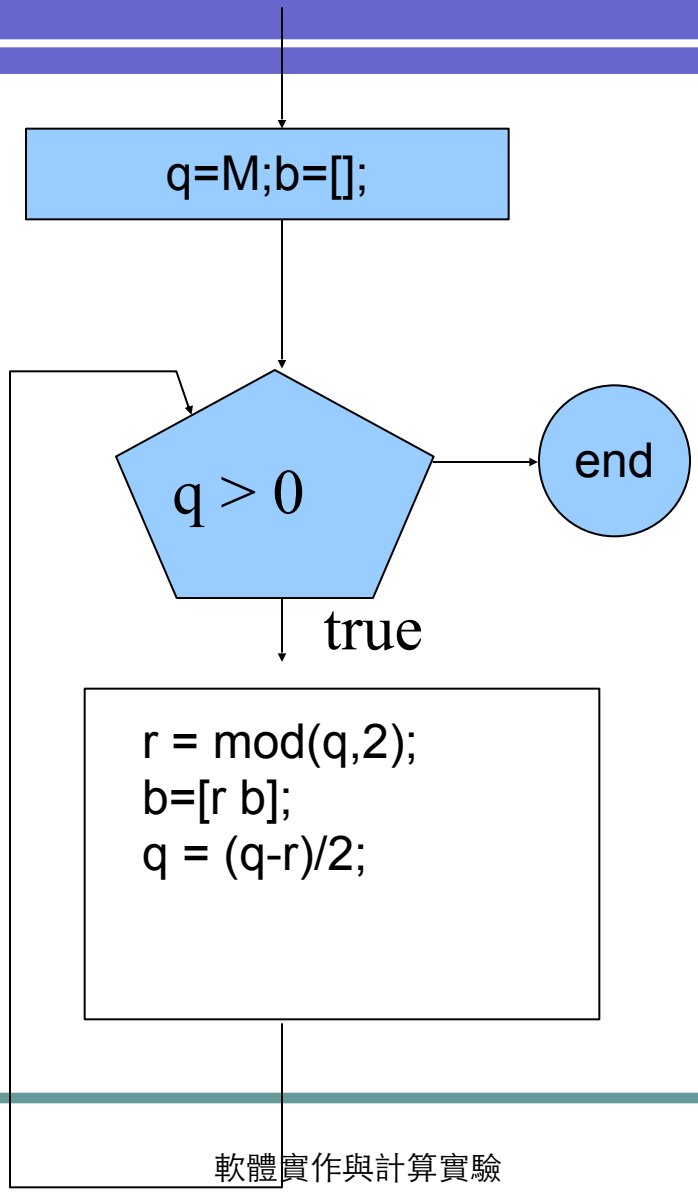
1 1 0 0 1

- The problem is to find b for given M

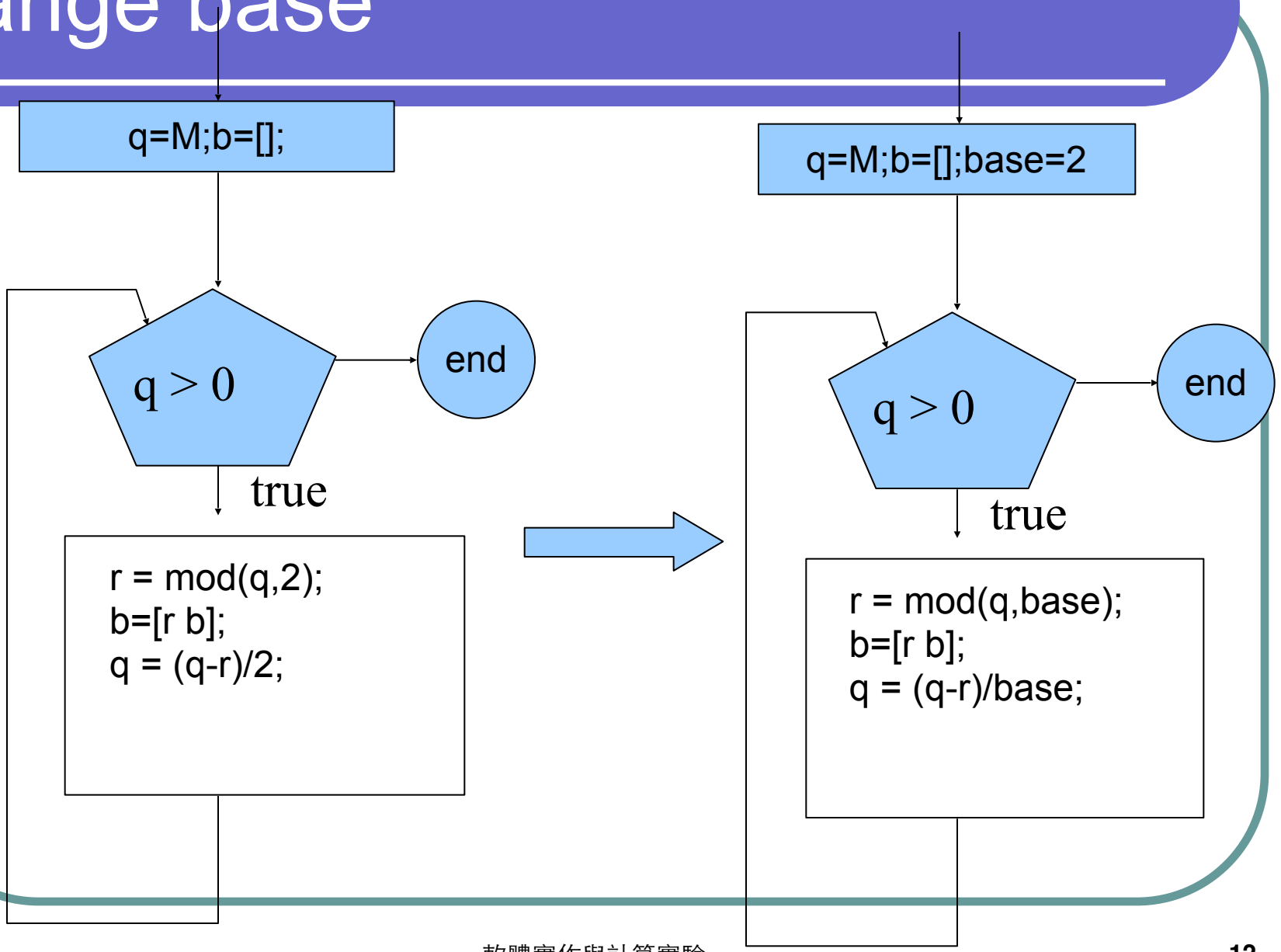
Example

- M > 0 $\mathrm{M} = b_n 2^{n-1} + b_{n-1} 2^{n-2} + \ldots + b_1 2^0$
- M=1, b_1=1
- M=5, b=[1 0 1]
- M=25, b=[1 1 0 0 1]
- The problem is to find b for given M

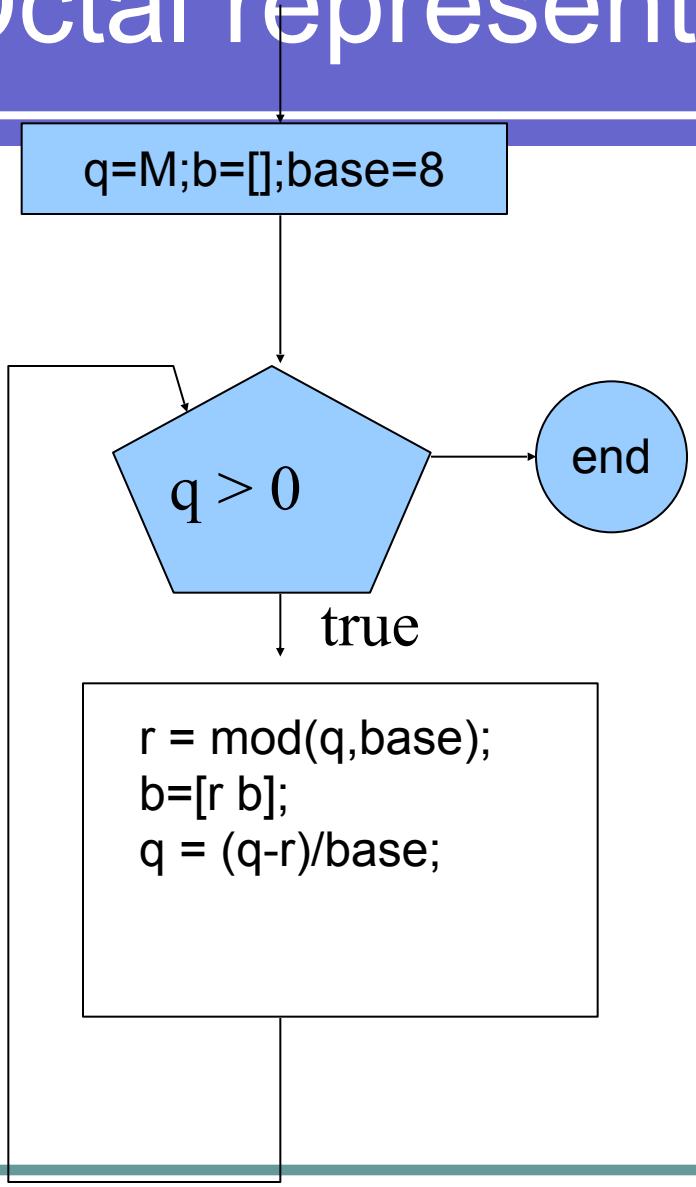
Determine b



Change base


q=M;b=[];
q > 0
end
true
r = mod(q,2);
b=[r b];
q = (q-r)/2;
q=M;b=[];base=2
q > 0
end
true
r = mod(q,base);
b=[r b];
q = (q-r)/base;

Decimal to Octal representation



```
>> dec2oct(7)

ans =

     7

>> dec2oct(8)

ans =

     1     0
```

```
>> dec2oct(18)

ans =

     2     2

>> dec2oct(64)

ans =

     1     0     0
```