M1 -- Size of Shapes Flowchart

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Purpose: Cross one side or the other

System Libraries
iostream

User Libraries
none

Global Constants
none

Function Prototypes
none

main

Declare Variables

unsigned short x;
char shape;
int i, j, num;

Prompt for Input

"Create a numbered shape that can be sized."
"Input an integer number [1,50] and a character [x,b,f]."

x, shape;

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```
                                                    ┌──────────┐
                                                    │   j++    │──────────┐
                                                    └──────────┘          │
                                                         ▲                │
                                                         │                │
          ┌─────────────────┐              ┌──────────────────┐           │
          │ Declare and     │    ┌─────────│      Output       │  ┌──────────────┐
 ◇        │ Initialize      │    │         │      " "          │  │   Output     │
shape=='x'│ Out of Loop     │    │         │    num= num-1 ;   │  │   num;       │
&&x%2==1  │                 │    │         └──────────────────┘  └──────────────┘
 ◇  True  │   floop=x       │    │                  ▲                   ▲
          └─────────────────┘    │                  │ False      True  │
   False                         │         ┌──────────────────────┐
                                 │         │  j == i || j == (x + 1 - i)  ◇
                                 ▼         └──────────────────────┘
                          ┌─────────────────┐           ▲
                          │ Declare and     │           │ True
                          │ Initialize      │           │
                          │ In For Loop     │    False  ◇
                          │                 │  ┌────────│ j<=x │
                          │    i=1          │  │
                          │    num=x;       │  ▼
                          └─────────────────┘ ┌──────────┐
                                              │  Output  │
                                              │  endl;   │    ┌──────────────────┐
                                              └──────────┘    │ Declare and      │
                                                   │          │ Initialize       │
                                                   ▼          │ In For Loop      │
                                            ┌──────────┐      │                  │
                                       ◄────│   i++    │      │    j=1           │
                                            └──────────┘      └──────────────────┘
                                                                     ▲
                            ◇                                        │
                          i<=x        True          ┌──────────────────┐
                            ◇ ────────────────────► │ Declare and      │
                                                     │ Initialize       │
                          False                      │ Out of Loop      │
                                                     │                  │
      ⬭                          ⬭                   │    floop=x       │
   Page 3         False    return 0                  └──────────────────┘
                          Exit from main
```

```
                                                        ┌─────────────┐
                                                        │    j++      │◄──────────┐
                                                        └─────────────┘           │
                                                               ▲                  │
                                                               │                  │
                                           ┌───────────────────┘                  │
                                           │            ┌────────────┐            │
                              ┌────────────┴───┐    ┌───┴────────────┐            │
                              │ Output          │    │ Output         │           │
                              │ num= num+1 ;    │    │ num;           │           │
                              └─────────────────┘    └────────────────┘           │
                                     ▲                      ▲ True                 │
        ( page 3 )                   │                      │                      │
                                     │            ◇ j == i || j == (x + 1 - i) ◇   │
                                  False └──────────┤                          │    │
                                                   └──────────────────────────┘    │
   ◇ shape=='x'&&x%2==0 ◇ ──True──► ┌──────────────┐          ▲ True              │
                                    │ Declare and  │          │                   │
                                    │ Initialize   │          │                   │
                                    │ Out of Loop  │  ◇ j<=x ◇                     │
                 │ False            │  floop=x     │  False ┌──┤                   │
                 │                  └──────────────┘        │  └────────┐         │
                 │                         │                │           ▲         │
                 │                         ▼            ┌────┴─────┐ ┌───────────┐ │
                 │                  ┌──────────────┐    │ Output   │ │ Declare   │ │
                 │                  │ Declare and  │    │ endl;    │ │ and       │ │
                 │                  │ Initialize   │    └──────────┘ │ Initialize│ │
                 │                  │ In For Loop  │         │       │ In For Loop│ │
                 │                  │   i=1        │         ▼       │   j=1     │ │
                 │                  │   num=1;     │    ┌──────────┐ └───────────┘ │
                 │                  └──────────────┘    │   i++    │      ▲        │
                 │                         │            └──────────┘      │        │
                 │                         │◄─────────────────┘    ┌───────────┐  │
                 │                         ▼                       │ Declare   │  │
                 │                    ◇ i<=x ◇ ──True──────────────│ and       │◄─┘
                 │                       │                         │ Initialize│
                 │                       │ False                   │ Out of Loop│
                 ▼                       │                         │  floop=x  │
            ( Page 4 )                   ▼                         └───────────┘
                                  ( return 0         )
                                  ( Exit from main   )
```

shape=='b'&&x%2==1

True

False

Declare and Initialize
Out of Loop

floop=x

Declare and Initialize
In For Loop

i=1
num=x;

Output

endl;

i++

i<=x

True

False

return 0
Exit from main

Declare and Initialize
Out of Loop

floop=x

Declare and Initialize
In For Loop

j=1

j<=x

True

False

j == i || j == x +1

True

False

Output
" "
num= num-1 ;

Output

num;

True

j++

shape=='b'&&x%2==0

True

Declare and Initialize
Out of Loop

floop=x

False

Declare and Initialize
In For Loop

i=1
num=1;

i<=x

True

False

return 0
Exit from main

Output

endl;

i++

Declare and Initialize
Out of Loop

floop=x

Declare and Initialize
In For Loop

j=1

j<=x

True

False

True

j ==i || j == x + 1

True

False

Output
" "
num= num+1 ;

Output

num;

j++

j++

shape=='f'&&x%2==1

True

Declare and Initialize
Out of Loop

floop=x

Output
" "
num= num-1 ;

Output

num;

False

j == (x + 1 - i)

True

True

False

j<=x

True

Declare and Initialize
In For Loop

i=1
num=x;

Output

endl;

Declare and Initialize
In For Loop

j=1

i++

i<=x

True

Declare and Initialize
Out of Loop

floop=x

False

False

return 0
Exit from main

```
              ┌─────────┐                                              ┌──────────┐
              │ page 7  │                                              │   j++    │
              └────┬────┘                                              └────▲─────┘
                   │                                                        │
                   ▼                                                        │
              ◇─────────◇         ╭──────────────────╮    ╱────────╲   ╱────────╲
             ╱           ╲        │ Declare and      │   │ Output   │ │ Output   │
            │ shape=='f'  │  True │ Initialize       │   │  " "     │ │          │
            │ &&x%2==0    ├───────│ Out of Loop      │   │ num=     │ │  num;    │
             ╲           ╱        │                  │   │ num+1 ;  │ │          │
              ◇─────────◇         │ floop=x          │    ╲────────╱   ╲────────╱
                   │              ╰──────────────────╯
                   │ False
```

shape=='f'&&x%2==0 — True → Declare and Initialize Out of Loop / floop=x

Output " " num= num+1 ;   Output num;

j == (x + 1 - i)   True / False

j<=x   True / False

Declare and Initialize In For Loop / j=1

Declare and Initialize Out of Loop / floop=x

Declare and Initialize In For Loop / i=1 num=1;

Output endl;

i++

i<=x   True / False

return 0 Exit from main