SHIFT INSTRUCTIONS

1) SAL/SHL destination, count
LEFT-Shifts the **bits of destination**.
MSB shifted **into** the **CARRY**.
LSB gets a **0**.

Bits are shifted 'count' number of times.
If count = 1, it is directly specified in the instruction.
If count > 1, it has to be given using CL Register.

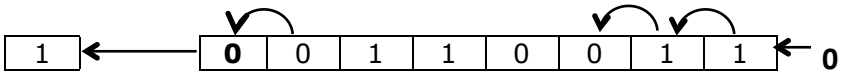
Destination: Register, Memory Location. #Please refer Bharat Sir's Lecture Notes for this ...

Eg: **SAL BL, 1** *; Left-Shift BL bits, once.*

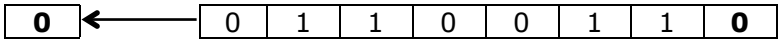
Assume:

Before Operation: BL = 0011 0011 and CF = 1

Carry **Destination**



After Operation: BL = 0110 0110 and CF = 0



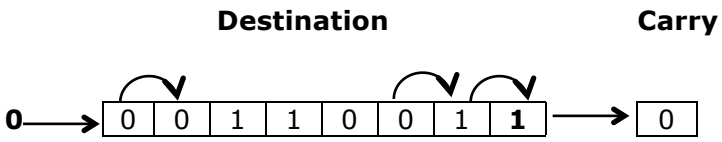
More examples:
MOV CL, 05H *; Load number of shifts in CL register.*
SAL BL, CL *; Left-Shift BL bits CL (5) number of times.*

2) SHR destination, count
RIGHT-Shifts the bits of destination.
MSB gets a **0** (∴ Sign is lost).
LSB shifted **into** the **CARRY**.

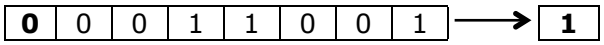
Bits are shifted 'count' number of times.
If count is 1, it is directly specified in the instruction.
If count > 1, it has to be given using CL register.
Eg: **SHR BL, 1** *; Right-Shift BL bits, once.*

Assume:

Before Operation: BL = 0011 0011 and CF = 0



After Operation: BL = 00011 1001 and CF = 1

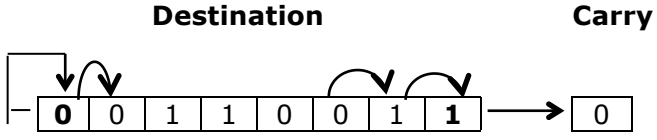


3) SAR destination, count
RIGHT-Shifts the bits of destination.
MSB placed **in MSB itself** (∴ Sign is preserved).
LSB shifted **into** the **CARRY**.

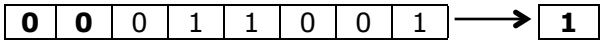
Bits are shifted 'count' number of times.
If count is 1, it is directly specified in the instruction.
If count > 1 it has to be given using CL register. ☺ For doubts contact Bharat Sir on 98204 08217
Destination: Register, Memory Location

Eg: **SAR BL, 1** *; Right-Shift BL bits, once.*

Assume:
Before Operation: BL = 0011 0011 and CF = 0



After Operation: BL = 0001 1001 and CF = 1

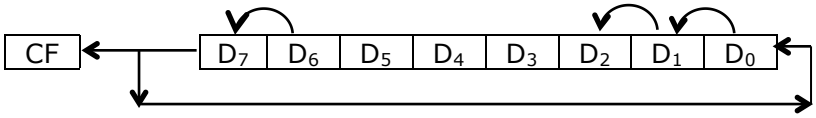


ROTATE INSTRUCTIONS

1) ROL destination, count

LEFT-Shifts the bits of destination.
MSB shifted **into** the **CARRY**.
MSB also goes **to LSB**.
Bits are shifted 'count' number of times.
If count = 1, it is directly specified in the instruction.
If count > 1, it has to be loaded in the CL register, and CL gives the count in the instruction.
Destination: Register, Memory Location
Eg: **ROL BL, 1** *; Left-Shift BL bits once.*

Carry **Destination**



More examples:

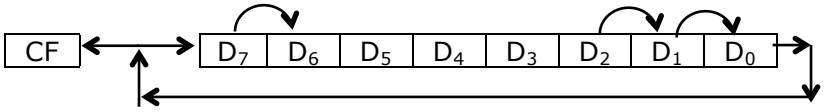
```
MOV CL, 05H      ; Load number of shifts in CL register.
ROL BL, CL       ; Left-Shift BL bits CL (5) number of times.
```

2) ROR destination, count

RIGHT-Shifts the bits of destination.
LSB shifted **into** the **CARRY**.
LSB also goes **to MSB**.
Bits are shifted 'count' number of times.
If count = 1, it is directly specified in the instruction.
If count > 1, it has to be loaded in the CL register, and CL gives the count in the instruction.
Eg:

```
ROR BL, 1        ; Right-Shift BL bits once.
```

Carry **Destination**

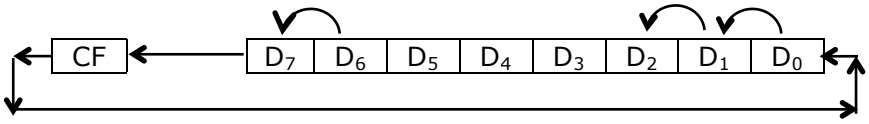


3) RCL destination, count

LEFT-Shifts the bits of destination.
MSB shifted **into** the Carry Flag **(CF)**.
CF goes **to LSB**.
Bits are shifted 'count' number of times.
If count = 1, it is directly specified in the instruction.
If count > 1, it has to be loaded in the CL register, and CL is specified as the count in the instruction.
Destination: Register, Memory Location

Eg: **RCL BL, 1** *; Left-Shift BL bits once.*

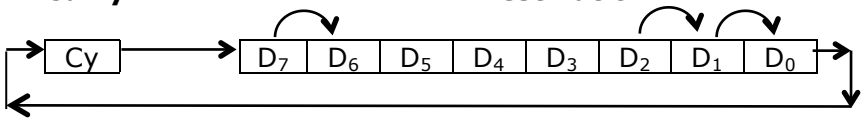
Carry **Destination**



4) RCR destination, count

RIGHT-Shifts the bits of destination.
LSB shifted **into** the **CF**.
CF goes **to MSB**.
Bits are shifted 'count' number of times.
If count = 1, it is directly specified in the instruction.
If count > 1, it has to be loaded in the CL register, and CL is specified as the count in the instruction.
Destination: Register, Memory Location
Eg:
RCR BL, 1 *; Right-Shift BL bits once.*

Carry **Destination**



More examples:
MOV CL, 05H *; Load number of shifts in CL register.*
RCR BL, CL *; Right-Shift BL bits CL (5) number of times.*