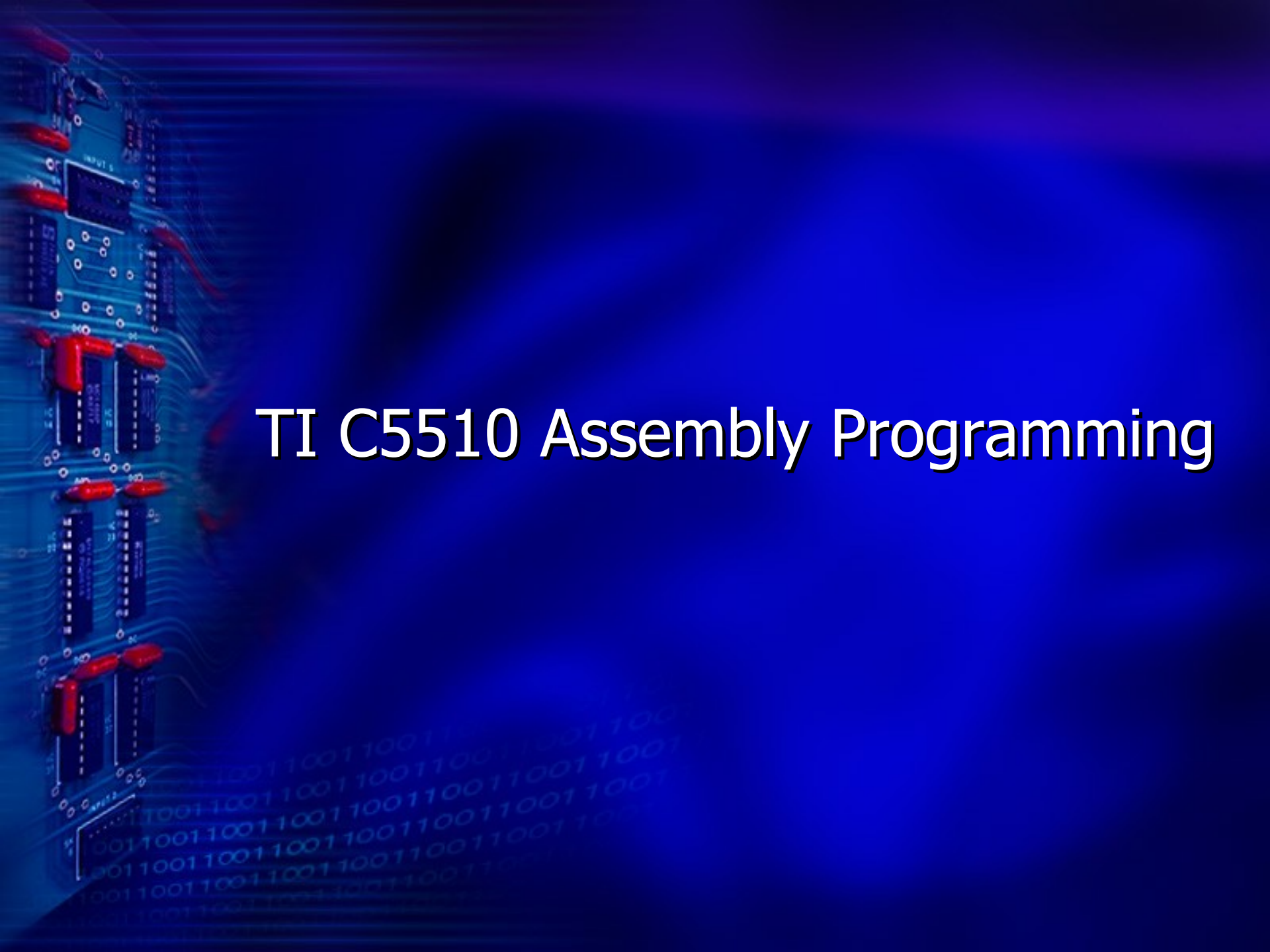
TI C5510 Assembly Programming

Preliminary

1.

- Smem → single memory access in the instruction.
  eg. *ARx, *(#K23), *(#K16), K16.
- Cmem → memory access through only CDP.
  eg. *CDP+ (only).
- Xmem, Ymem
  → both occur together always.
  → two memory accesses (see dual indirect addressing mode).
  eg. *(ARx+Tx), *(ARx-Tx) , *ARx+, *ARx- (only).

2.

- src, dst → can be Tx, ARx, or ACx

Preliminary

3.
- RELOP → can be ==, !=, <, and >=.

4.
- cond → see sec. 1.2 (page 17) of spru374g.pdf.

5.
- pmad → a label in the program (i.e. a program address)

6.
- With MPY, MAC, and MAS:
  - M → preference of memory access in the instruction
  - K → Preference of immediate value in the instruction
  - R → Preference of rounding in the instruction

MPY's

Command	Operand 1,	Operand 2,	Operand 3
MPY	ACx Tx	ACy ACx	ACy
MPYM	memory	memory Tx ACx	ACx ACx ACy
MPYK	const	ACx	ACy
MPYMK	memory	const	ACx

Examples of MPY's

- eg. MPY AC0, AC1 ; AC1=hi(AC1)*hi(AC0)

  eg. MPY T1, AC2, AC3 ; AC3=T1 * hi(AC2)

- eg. MPYM *AR1+, T0, AC1 ; AC1=(*AR1)*T0; AR1=AR1+1

  eg. MPYM *(AR1+T0), AC2, AC3 ; AC3=hi(AC2)*AR1, AR1=AR1+T0

  eg. MPYM *AR0+, *AR2+, AC2 ; AC2= (*AR0)*(*AR2)
  ; AR0=AR0+1, AR2=AR2+1

- eg. MPYK #10, AC1, AC2 ; AC2=10*hi(AC1)

- eg. MPYMK *AR1+,#200, AC1 ; AC1= (*AR1)*200, AR1=AR1+1

MAC's

Command	Operand 1,	Operand 2,	Operand 3,	Operand 4
MAC	ACx ACy	Tx Tx	ACy ACx	[ACy] ACy
MACM	Smem Smem Xmem	[ACx] Cmem Ymem	ACy ACy ACx	
MACK	Tx	const	ACx	[ACy]
MACMK	Smem	const	ACy	

Examples of MAC's

- eg. MAC AC0, T1, AC2 ; AC2=AC2+hi(AC0)*T1
- eg. MAC AC0, T0, AC2, AC0 ; AC0=AC2+hi(AC0)*T0
- eg. MACM *AR3, AC2, AC3 ; AC3=AC3+hi(AC2)*(*AR3)
- eg. MACM *AR2, *CDP, AC2 ; AC2=AC2+(*CDP)*(*AR2)
- eg. MACM *AR2, *AR3, AC3 ; AC3=AC3+(*AR2)*(*AR3)
- eg. MACK T1, #16, AC3, AC2 ; AC2=AC3+16*T1
- eg. MACMK *AR2, #101, AC3 ; AC3=AC3+(*AR2)*101

MAS's

Command	Operand 1,	Operand 2,	Operand 3,	Operand 4
MAS	Tx	ACx	ACy	
MASM	Smem Smem Smem Xmem	Cmem ACx Tx Ymem	ACx ACy ACx ACx	 ACy ACy

Examples of MAS's

- eg. MAS T0, AC1, ACW ; AC2=AC2-hi(AC1)*T0
- eg. MASM *AR2+, *CDP+, AC3 ; AC3=AC3-(*AR2)*(*CDP),
  ; AR2=AR2+1, CDP=CDP+1

eg. MASM, *AR3+, AC0, AC2 ; AC2=AC2-hi(AC0)*(*AR3)
; AR3=AR3+1

eg. MASM *AR3+, *AR2+, AC1, AC3 ; AC3=AC1-(*AR3)*(*AR2)
; AR3=AR3+1, AR2=AR2+1

ADD

Command	Operand 1,	Operand 2,	Operand 3
ADD	src	dst	
	Smem	dst	
	const	dst	
	const<<#SHIFTW	ACx	
	Smem<<#16	ACx	
	Smem<<Tx	ACx	
	Smem<<#SHIFTW	ACx	
	Xmem	Ymem	ACx

* SUB is same as above.

Examples of ADD

- eg. ; AR0=AR0+T0

  eg. ; AC0=AC0+T0

  eg. ; AC2=AC2+(*AR6)<<#16
  ; AR6=AR6+1

  eg. ; AC3=AC3+(*AR6)<<T0
  ; AR6=AR6+1

  eg. ; AC1=AC1+(*AR2)<<#SHIFTW
  ; AR2=AR2+T0

  eg. ; T3=T3+2000

  eg. ; AC2= (*AR3)+(*AR4)
  ; AR3=AR3+1, AR4=AR4+1

Branch

Command	Operand 1,	Operand 2
B	ACx label	
BCC	label	cond
BCC	label	src RELOP #K8
XCC	cond	
XCCPART	cond	
CALL CALL CALLCC	ACx label label	 cond

Examples of Branch

- eg. B AC0 ; Branch to address specified in the
  ; lower 24-bit of AC0

eg. B there ; Branch to location labeled 'there'

eg. BCC iamhere, T0<=#0 ; Branch to label 'iamhere' if T0<=0

eg. BCC again, AR0==#0 ; Branch to 'again' if AR0==0

eg. BCC yetagain, ACO>#0 ; Branch to 'yetagain' if AC0>0

eg. BCC diffbranch, AR0>=#12 ; Branch to 'diffbranch' if AR0>=12

- eg. XCC AR0==#0 ; AC0=AC0>>1 if AR0==0
  SFTS AC0, #-1 ; otherwise nothing happens

Examples of Branch

eg. XCC AC2>=#0 ; AC2=hi(AC1)*T0 if AC2>=0
MPY T0, AC1, AC2 ; otherwise nothing happens

- eg. CALL function ; control passed to label 'function',
; the address of the next instruction
; is stored on the stack

RPT's

Command	Operand 1,	
RPT	#K8 CSR	
RPTBLOCAL	label	[BRC0, BRC1]
RPTB	label	[BRC0, BRC1]

Examples of RPT's

- eg.

In C:

```
for(i=0;i<12, i++)
      Sum=Sum+a[i];
```

In Assembly:

```
XOR AC0                 ;AC0=Sum
RPT   #11
ADD *AR1+, AC0          ;AR1→ a[0]
```

Examples of RPT's

- eg.

MOV

Command	Operand 1,	Operand 2
Accumulator load from memory		
MOV	Smem<<#16	ACx
	Smem	ACx
	Smem<<#SHIFTW	ACx
	Smem<<Tx	ACx
Accumulator store to memory		
MOV	ACx	ARx
	hi(ACx)	ARx
	rnd(hi(saturate(ACx)))	ARx
	rnd(hi(saturate(ACx<<Tx)))	ARx

Examples of MOV

- eg. ; hi(AC0)=(*AR1), lo(AC0)=0, AR1=AR1+1

eg. ; lo(AC0)=(*AR3), hi(AC0)=sign extended,
; AR3=AR3+1

eg. ; AC0= (*AR7)<<30, AR7=AR7-1

eg. ; AC2=(*AR5)<<T1, AR5=AR5+T0

- eg. ; (*AR2)=lo(AC2), AR2=AR2+1

eg. ; (*AR2)=hi(AC2), AR2=AR2+1

eg. ; (*AR3)=hi(satruated(rounded(AC0))),
; AR3=AR3+1

eg. ; (*AR7)=hi(satruated(rounded(AC0<<T0))),
; AR7=AR7+1

MOV

Command	Operand 1,	Operand 2
CPU register load from memory		
MOV	Smem	BRC0 BRC1 CSR
MOV	Tx	BRC0 BRC1 CSR
MOV	ARx	BRC0 BRC1 CSR

Examples of MOV

- eg. ; BRC0=(*AR1), AR1=AR1+1

  eg. ; BRC1=(*AR1), AR1=AR1+1

  eg. ; CSR=(*AR1), AR1=AR1+1

- eg. ; BRC0=T0

  eg. ; BRC1=AR1

  eg. ; CSR=AR2