Sunbeam Institute of Information Technology
# Pune and Karad

Module - Embedded C Programming
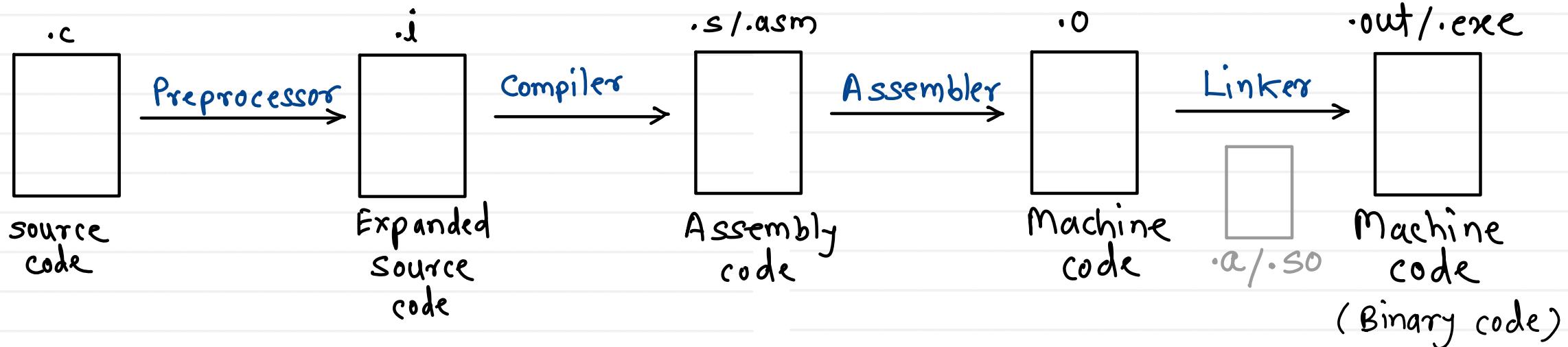
Trainer - Devendra Dhande

Email – devendra.dhande@sunbeaminfo.com
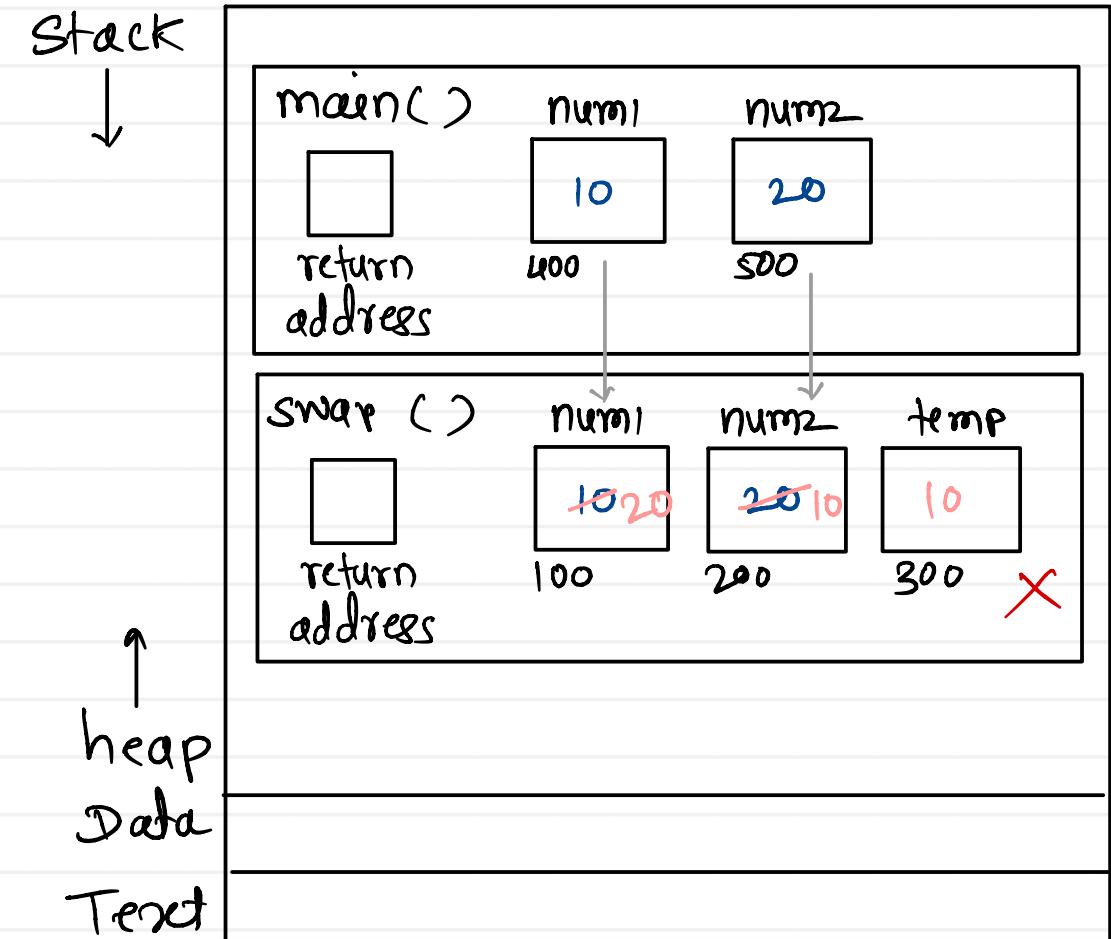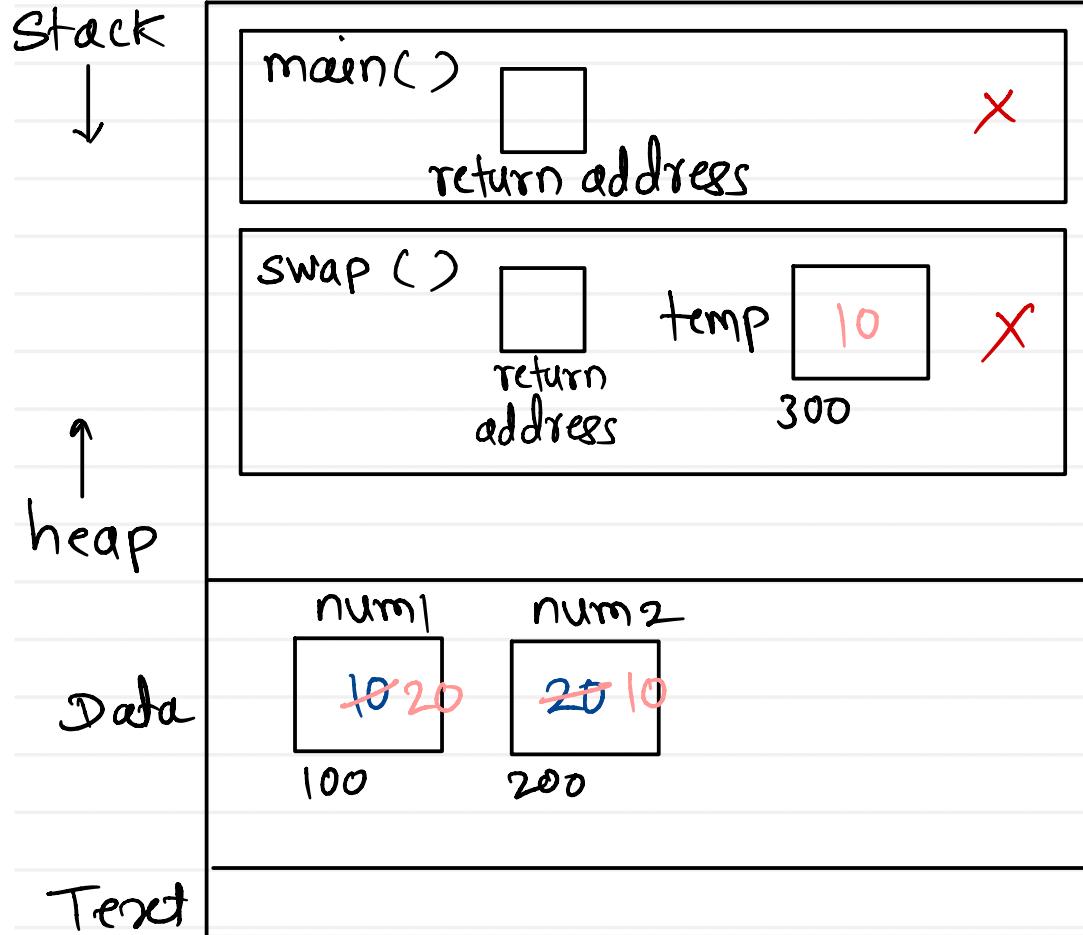
Toolchain :
  – set of tools like preprocessor, compiler, assembler, linker, debugger, etc.
                        (cpp)   (cc)   (as)   (ld)   (gdb)
  - all tools work on source code one by one to convert it into machine code

.c   .i   .s/.asm   .o   .out/.exe

[ ] --Preprocessor--> [ ] --Compiler--> [ ] --Assembler--> [ ] --Linker--> [ ]

source   Expanded   Assembly   Machine   .a/.so   Machine
code   Source   code   code   code
              code   (Binary code)

  – objdump/readelf tools are used to read
   sections of executable
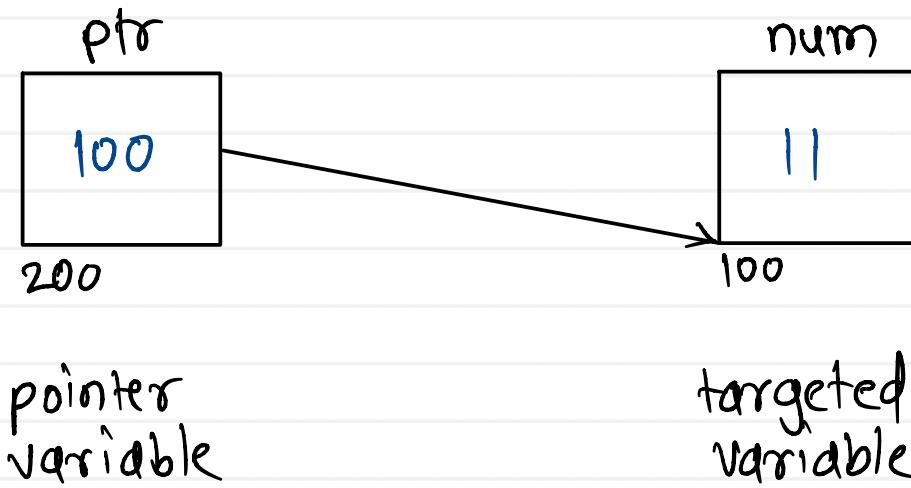
Call by value

int *ptr = #   int num = 11;   int temp = *ptr; ← reading the value of targeted variable

temp = 11

ptr

$\boxed{100}$

200

num

$\boxed{11}$

100

*ptr = 22; ← writing the value of targeted variable

num = 22

pointer variable

targeted variable

ptr = 100

&ptr = 200
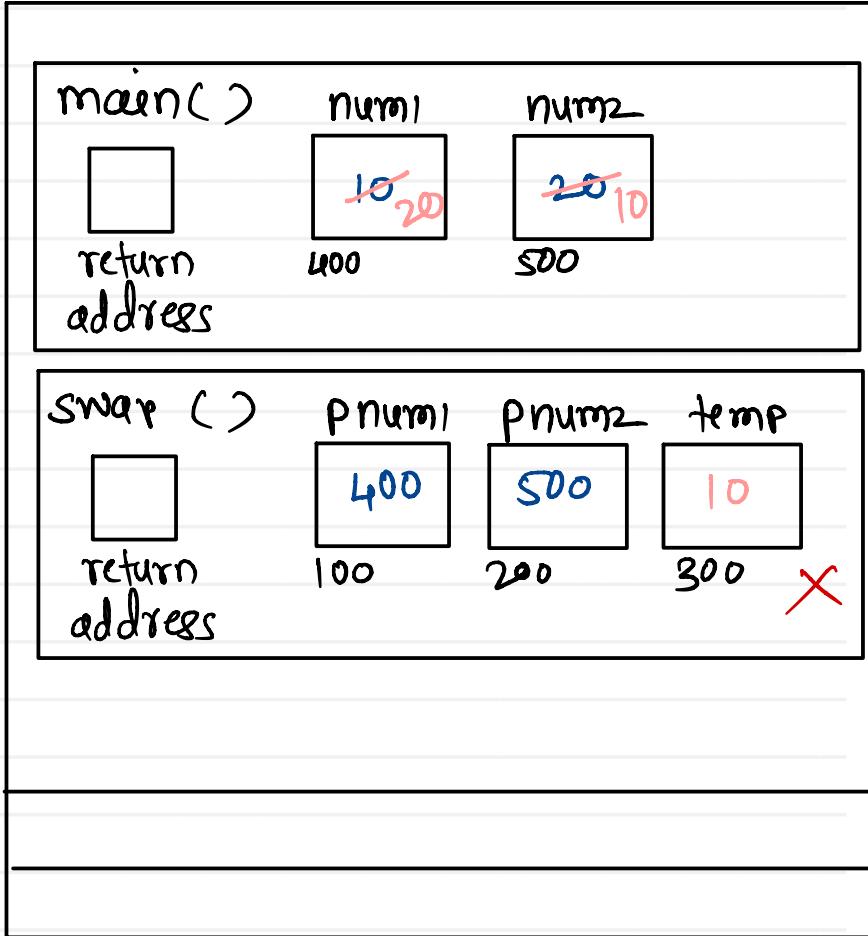
*ptr = *100 = 11

num = 11

&num = 100

value of ptr = 100

value at ptr = 11

Stack ↓

main()

[ ] return address

num1
~~10~~ 20
400

num2
~~20~~ 10
500

swap()

[ ] return address

pnum1
400
100

pnum2
500
200

temp
10
300 ✗

↑ heap

Data

Text
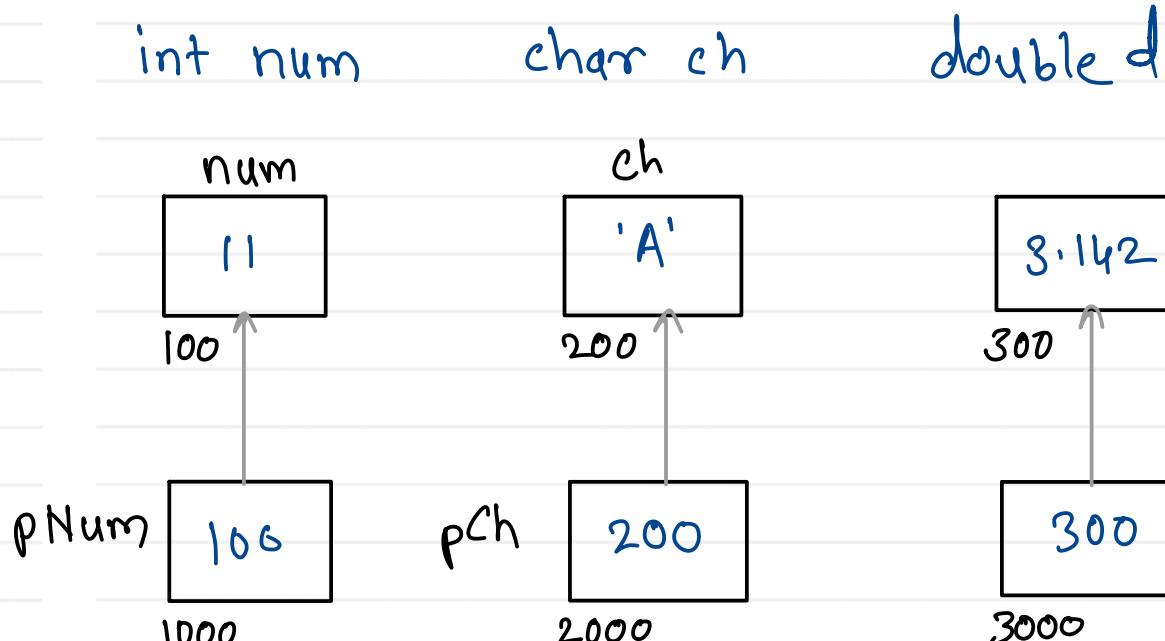
*pnum1 = *400 = 10
*pnum2 = *500 = 20

& - address of / reference
  - to get address of variable

* - value at / dereference
  - to get value of targeted variable

int num   char ch   double d

num   ch
┌──────┐   ┌──────┐   ┌──────┐
│ 11 │   │ 'A' │   │ 3.142│
└──────┘   └──────┘   └──────┘
100   200   300

pNum ┌──────┐   pCh ┌──────┐   ┌──────┐
     │ 106 │   │ 200 │   │ 300 │
     └──────┘   └──────┘   └──────┘
     1000   2000   3000

int *pNum   char *pCh   double *pd
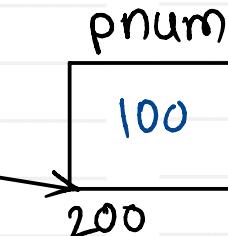
pNum = 100   pCh = 200   pd = 300
*pNum = 11   *pCh = 'A'   *pd = 3.142
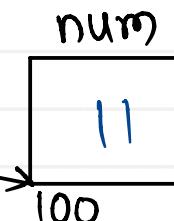
pointer to pointer variable

pointer variable

integer variable

int **ppnum = &pnum;

int *pnum = #

int num = 11;

ppnum

200

300

pnum

100

200

num

11

100

ppnum = 200
&ppnum = 300
*ppnum = *200
        = 100

**ppnum = **200
        = *100
        = 11

pnum = 100
&pnum = 200
*pnum = 11

num = 11
&num = 100

Thank you!!!

Devendra Dhande

devendra.dhande@sunbeaminfo.com