C

→ If a comment starting with "//", then ~~next~~ and ending with "\", then next line is also considered as a comment.

→ Variable name should not start with a number.

→ Declaration :- Simply declares that the variable/function exists somewhere in the program but memory is not allocated for them Yet, like it acknowledges, the data type of variable (or) arguments of function.

Definition := Declaration + Allocation of memory

So, int a; ⇒ both declaration and definition
extern int y; ⇒ only declaration

→ classifiers

→ Static variable :- It retains it's value between multiple functional calls.

~~int~~ void func() { ~~int y=~~
static y = 10;
y+=10;
print(y); }

int main()
func(); func(); func(); return 0; }

Output:
20
30
40

Food Security Card

Card No	: 365380426417
Card Type	: FSC
F.P Shop No	: 1481011
UID	: 511422631414
Name of Head of Household	: Chunchun Devi
Father/Husband Name	: -
Address	: 12-101,VALLABNAGAR,12-101,VALLABNAGAR,MAHABUBNAGAR.
Mandal	: Mahabubnagar
District	: Mahbubnagar
Gas Connection :	: No
LPG Consumer No.	:

Family Members Details

SNo	Name	UID	DOB	Photo
1	Chunchun Devi	511422631414	0	
2	Dablu Yadav	237007568906	0	
3	Damodar Sav	236125868139	0	
4	Dalagiriya Devi	819405024170	0	
5	Daablu Sah	321937697685	0	

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→ Extern variable :- can be shared between multiple C files. It says to search else where for the declaration.

→ 32 reserved keywords in C.

→ Const :- can't change their value.

→ Void :- No datatype

Void func ( ) => no return data

func(void) => no argument

→ Automatic variables :-

All variables that are declared inside the block are automatic variables by default. It is opposite of local variables

Redeclaration

compilation errors

```
int main()
{
    int x = 1;
    int x = 2;
}
```

fails

```
int main
{
    int x;
    int x=1; }
```

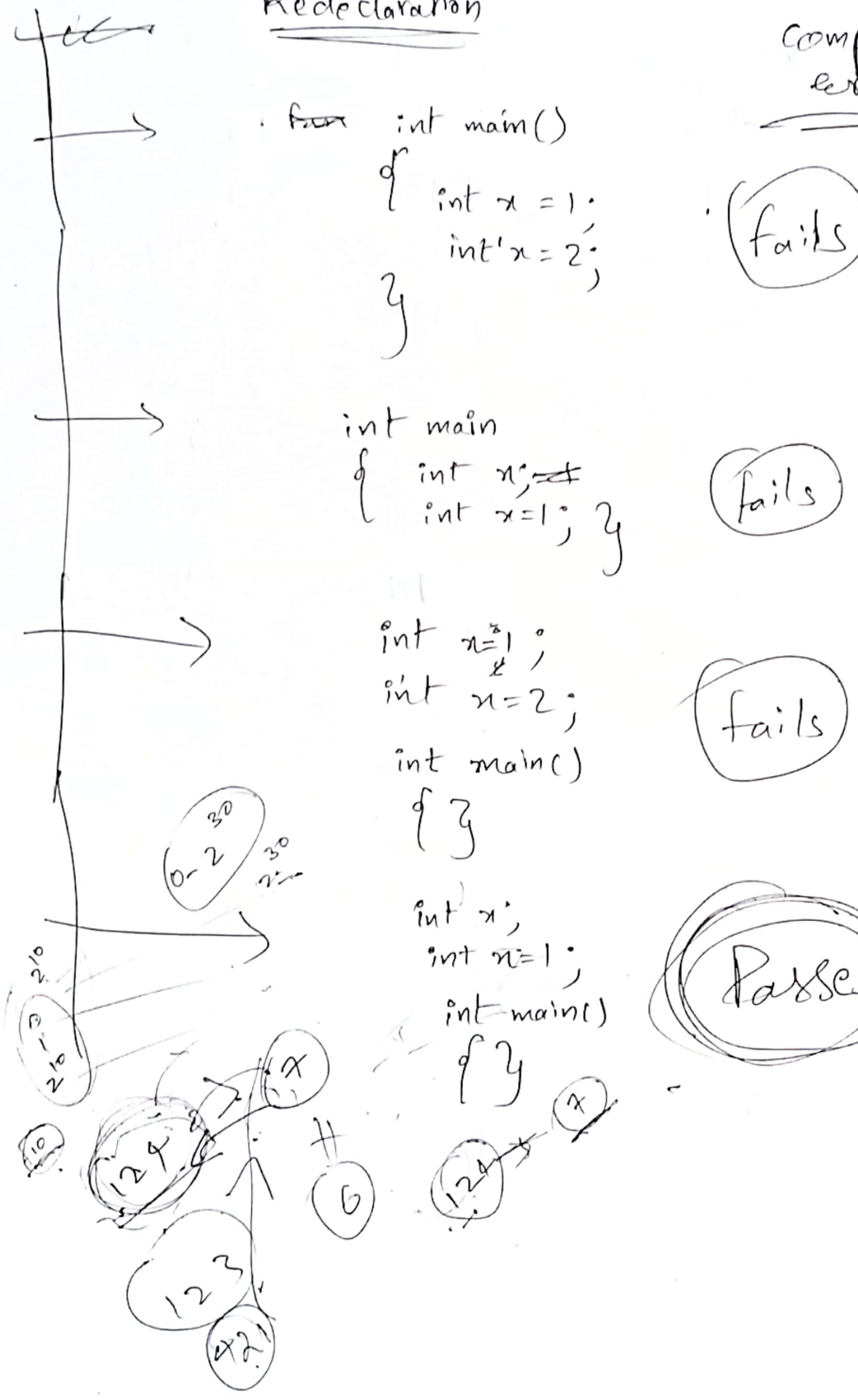
fails

```
int x=1;
int x=2;
int main()
{ }
```

fails

```
int x;
int x=1;
int main()
{ }
```

Passes



Food Security Card

Card No	: 365380426416
Card Type	: FSC
F.P Shop No	: 1481011
UID	: 548315029132
Name of Head of Household	: Rajmuni Devi
Father/Husband Name	: -
Address	: 12-70/A,RAMNAGAR,12-70/A,RAMNAGAR,MAHABUBNAGAR.
Mandal	: Mahabubnagar
District	: Mahbubnagar
Gas Connection :	: No
LPG Consumer No.	:

Family Members Details

SNo	Name	UID	DOB	Photo
1	Rajmuni Devi	548315029132	0	
2	Rajgovind Choudhary	767819608603	0	
3	Rajindra Yadav	900715091565	0	
4	Rajnarayn Choudhary	548127906474	0	
5	Ram Awadhesh Choudhary	221942880014	0	

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Steps to Read a declaration: (Spiral way / Clockwise)

1) Convert C declaration to postfix format and read from right to left.

2) To convert into postfix, start from innermost parenthesis, if innermost parenthesis is not present, then start from declarations name and go right first. When first ending parenthesis encounters, then go left. Once whole parenthesis is parsed, the come out parenthesis

3.) Continue till complete declaration has been parsed.

Ex:- 1) 

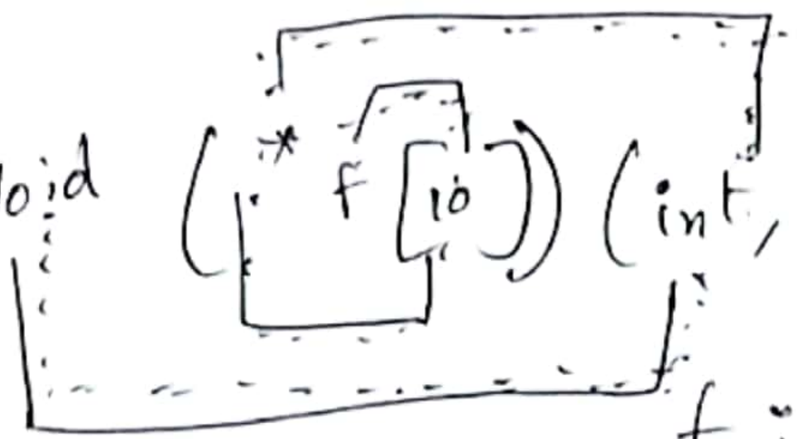
=> fp * ( ) int

* fp is pointer to function returning in

2) 

=> day * [13] int

day is pointer to array of 13 int.

3) 

=> f[10] * (int, int) void

f is array of 10 pointers to function of args (int, int) returning void.

Food Security Card

Card No	: 365380426415
Card Type	: FSC
F.P Shop No	: 1481011
UID	: 784917745436
Name of Head of Household	: Chanda Devi
Father/Husband Name	: -
Address	: 12-21/2a/1,VALLABNAGAR,12-21/2a/1,VALLABNAGAR,MAHABUBNAGAR.
Mandal	: Mahabubnagar
District	: Mahbubnagar
Gas Connection :	: No
LPG Consumer No.	:

Family Members Details

SNo	Name	UID	DOB	Photo
1	Chanda Devi	784917745436	0	
2	Chanda Devi	604776287695	0	
3	Chandan Kumaar	751727689764	0	

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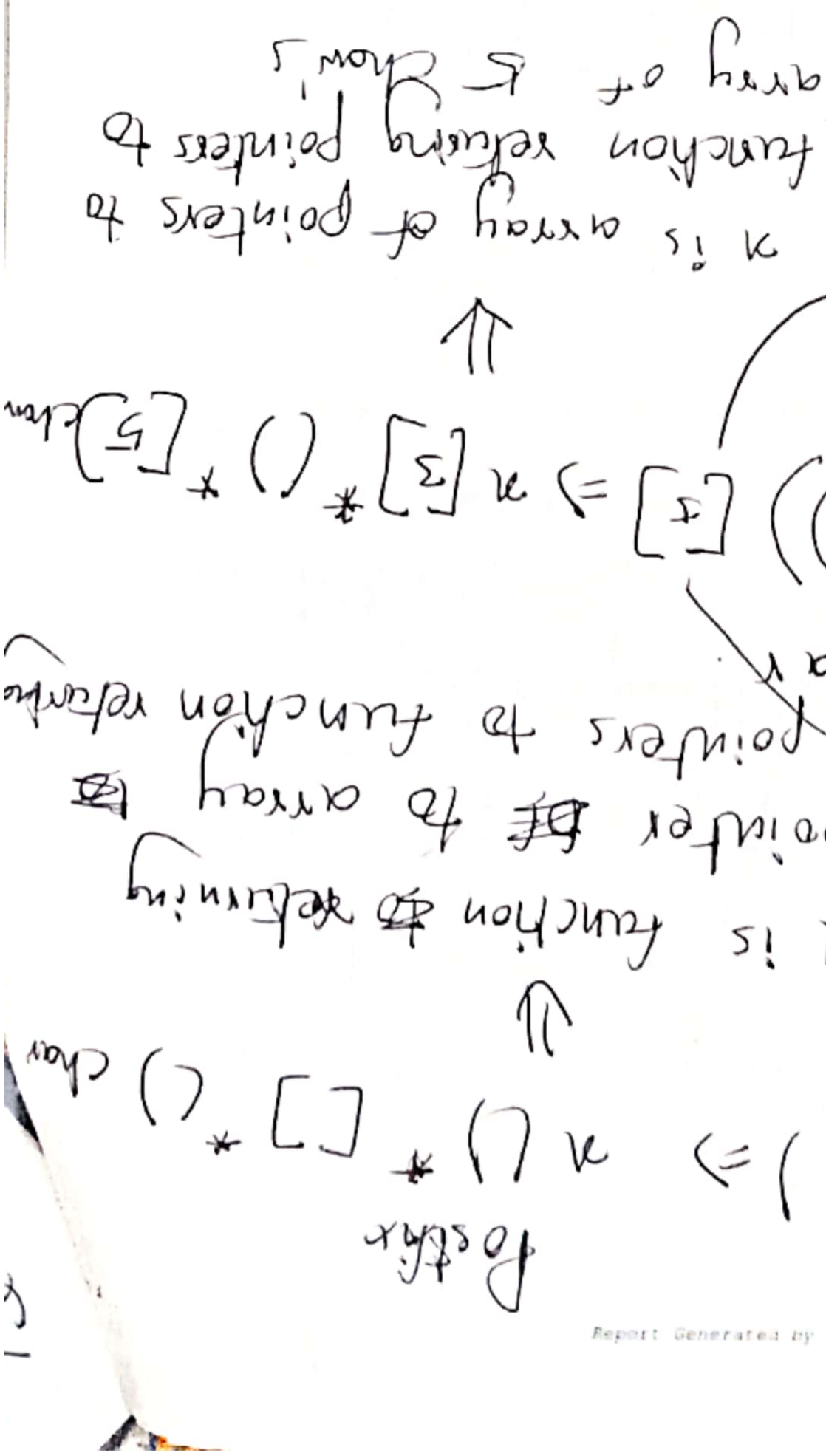


6) Int *(*(*arr[5])())()

⇓

arr[5] * () * () * int

⇓

arr is array of 5 pointers to function returning pointer to function returning pointer to int.

7) void (*b (int s, void (*fun)(int))) (int)

⇓

b (int, fun*(int) void) * (int)

⇓

b is a function (which takes an int & a pointer to function (that takes int as arg returning void)) returning pointer to function taking int as arg returning void.

Integer promotion

Some data types like char, short int takes less no of Bytes than int, these data types are automatically promoted to int or unsigned int when operation is performed on them. FIDR, the values of these are converted into integers

Ex:-

```
int main(){ char a = 40, b = 30, c = 10;
char d = (a*b)/c;
printf("%d", d); return 0; }
```

output is :- 120

Explanation :-

when a*b = 1200 > 128 (char = -128 to 128) which causes overflow., ~~because~~ But they are converted to ints and gives appropriate answer.

B 50, char ⇒ -128 to 128, unsigned char ⇒ 0 to 256

Comparision between double and float

→ ~~if~~ ~~x=~~ When a double and a float are involved in an operation, Floats are converted into double. (23 bits after. / 52 bits after.)

→ Special Cases :-

If ~~a~~ there is a number which cannot be expressed ~~w~~ in float without rounding, ~~but conversion~~ it is a different no in double. (needs more than 23 bit precision)

Ex :- float x = 0.1;
double x = 0.1;

⇒ ~~#~~ ~~to~~ ~~conv~~(0.1) is converted into ~~dec~~ binary when it terminates at ~~5~~ and ~~6~~ place, so, when it gets converted float (23 bits) ~~it~~ it is less than when converted into double

Static

→ Static (or) ~~used~~ global variables are initialized to 0 if not.

So, static is only valid for constant literals like ~~#~~

→ All objects with static storage duration must be initialized before execution of main() starts.

So,

```
int main()
{ static int x = 50; }
```

(works)

```
int wew(void)
{ return 50; }
int main()
{ static int x = wew(); }
```

(won't work)

→ when a function is declared with static before it, it cannot be accessed by outside C files.

Scansets :- wildcards for scanf

for ex:-

```
scanf("%[A-Z]s", str);
```

↓

Scans only capital letters ~~[illegible]~~ and terminates when others are seen.

Ex2:-

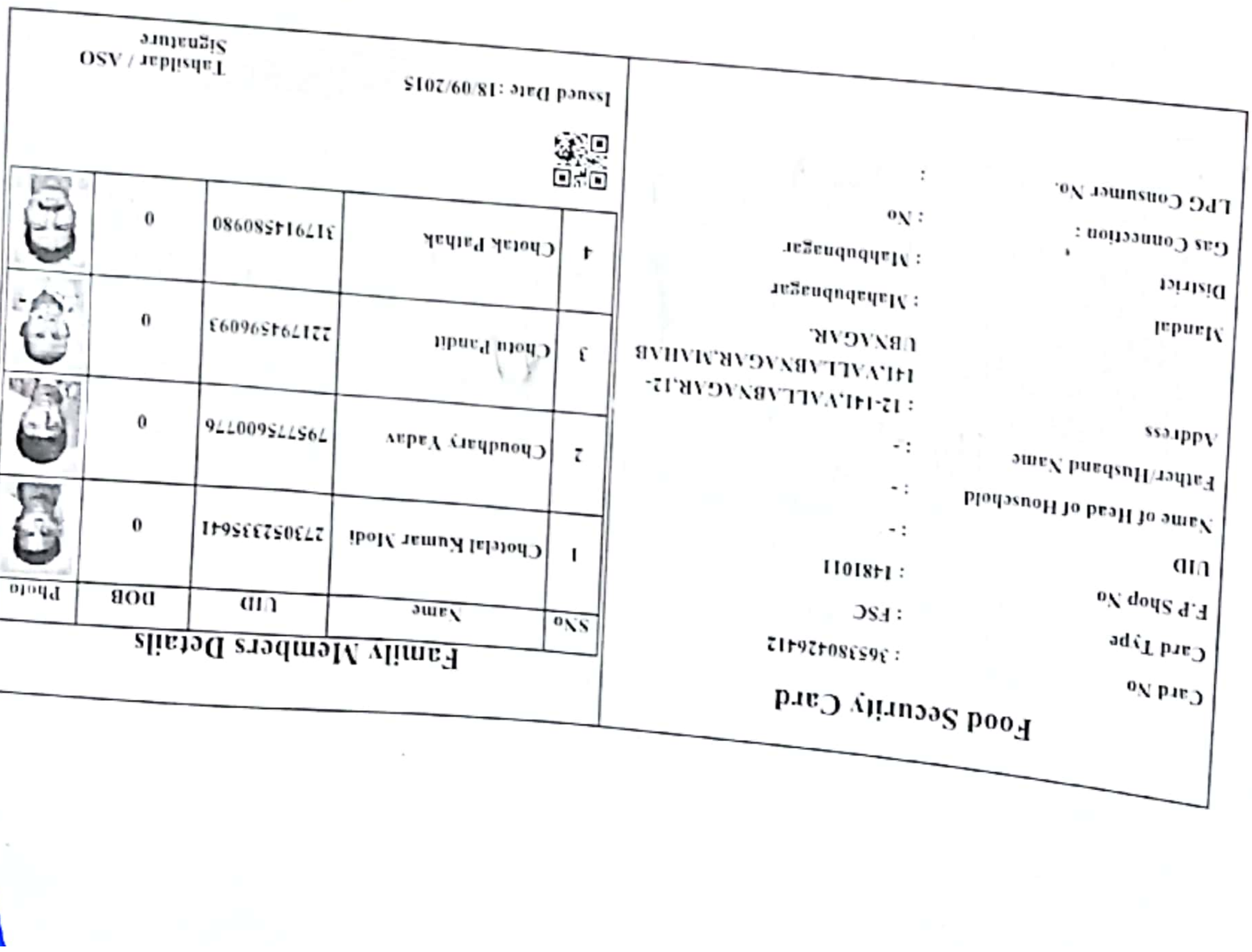
```
scanf("%[^\n]s", str);
```

↓

Scans till new line is caught.

↓

equivalent to gets()



Pointers

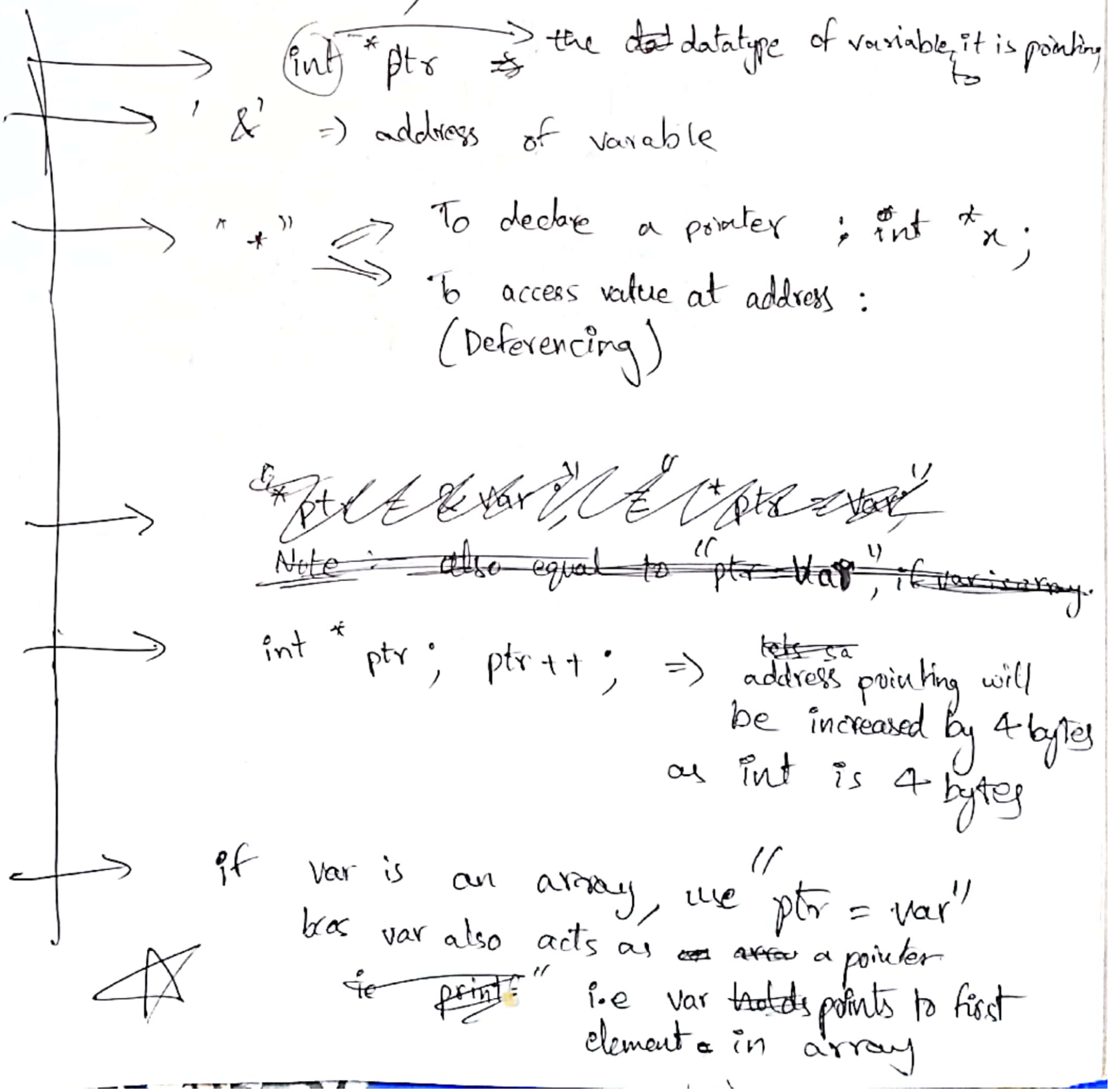
```
int var = 10;
```
Value at Address 2005
10

```
int *ptr = &var;
```
10

```
*ptr = 20;
```
20

```
int **ptr = &ptr;
```
20

```
**ptr = 30;
```
30



~~tenit~~ Nevertheless ~~area~~ main difference b/w array and pointer is ~~that~~ address ~~po~~ at which the array is pointing cannot be changed.

function pointer :- void (*ptr) (int);

pointer to structure :

```
typedef struct xy { int x; int y; } xy;
int main ( ){
 xy *ptr =NULL;
 ptr =malloc (sizeof( xy));
 ptr → x =10; ptr → y =20;
 printf ("x =%d\n", ptr→x);
 printf ("y = %d\n", ptr→y);
}
```

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Food Security Card

Card No	: 365380426411
Card Type	: FSC
F.P Shop No	: 148101I
UID	: 582410409989
Name of Head of Household	: Aarti Devi
Father/Husband Name	: -
Address	: 12-125/2/B.RAMNAGAR.12-125/2/B.RAMNAGAR.MAHAB UBNAGAR
Mandal	: Mahabubnagar
District	: Mahabubnagar
Gas Connection :	: No
LPG Consumer No.	:

Family Members Details

SNo	Name	UID	DOB	Photo
1	Aarti Devi	582410409989	0	
2	Yogendra Shah	367442413827	0	
3	Aarti Kumari	855618788305	0	
4	Abhay Kumar	286186262665	0	
5	Aarti Devi	576612614229	0	

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for an array ~~pointer~~,

$*(*(arr+x)+y) \equiv arr[x][y]$

double ptr ;

```
int var=10; int *ptr1; int **ptr2;
*ptr1 = &var; *ptr2 = ptr1;
printf("~~int~~ ptr1 = %d\n", *ptr1);
printf(" ptr2 = %d\n", **ptr2);
```

Output :-

10
10

~~&~~ ~~ptr~~ ~~int~~

```
char *ptr = "phew";
print(" => %c\n", *ptr);
~~print(" => %c\n");~~
print(" => %s\n", ptr);
```

output :-

p
phew

Dangling pointer scenario's

```
int *ptr = malloc (sizeof (int));
free(ptr); // Now it's dangling
```

```
int *fun()
{ int x = 5; return &x; }
int main()
{ int *p = fun();
  fflush(stdin);
  // Now as the function goes out of ~~scope~~ scope,
  // it is a dangling pointer
  // if the variable is set to static
  // It won't be dangling pointer now.
```

Also, if variable goes out of scope, it becomes dangling -

→ Void pointer

Void pointer is can point to data which doesn't have any specific type. ~~It~~

Ex :- If it points to int, it becomes int pointer etc -

→ NULL pointer - it points to Nothing.

→ Wild pointer :- when pointer is not been initialized to anything (not even NULL)

→ function pointer : Ex :- int (*ptr) (int);

Code :-

```
int sum(int x, int y) {return x+y;}
int main()
{ int (*ptr)(int,int); } //or int (*ptr)(int,int) = sum;
  ptr = sum;
  print("sum = %d\n", pt(2,3));
```

Output

→ function pointer store code, not data

points to first instruction of code

Pointer Vs Array

→ sizeof(*ptr) ⇒ size of datatype or variable
sizeof(arr) ⇒ size of array

→ &arr[0] ⇒ address of first element
&ptr ⇒ address of ptr itself

→ char arr[] = "abc" ⇒ ≡ char arr[] = ["a","b","c","\0"]

char *ptr = "abc"
≡ ptr pointing to string "abc"

→ int a[10]; int *p;
p = a; //valid
a = p; //invalid ⇒ p++; //valid
a++; //invalid.

pt: the pointer that points to 0th element of array is completely different from the pointer that points to whole ~~for~~ array

Ex:-

```
int main()
{  int *p;
   int arr[5];
   p = arr;        // p points to arr[0]
   int (*ptr)[5];
   ptr = &arr;     // ptr points to arr
   printf("p = %p, ptr = %p\n", p, ptr);
   p++; ptr++;
   printf("p = %p, ptr = %p\n", p, ptr);
   return 0; }
```

Output:-

p = 0x00 , ptr = 0x00

p = 0x04 , ptr = 0x14

So, p changes to arr[i]

but ptr changes to ~~next 20 arr~~ ~~ptr+~~ ~~&adr~~ (&(adr)) + 20

Mix of const, char and *

Ex:- const mea is combined with whatever is to it's immediate left, if nothing, then it's immediate right.

→ Case 1:- const char * p;

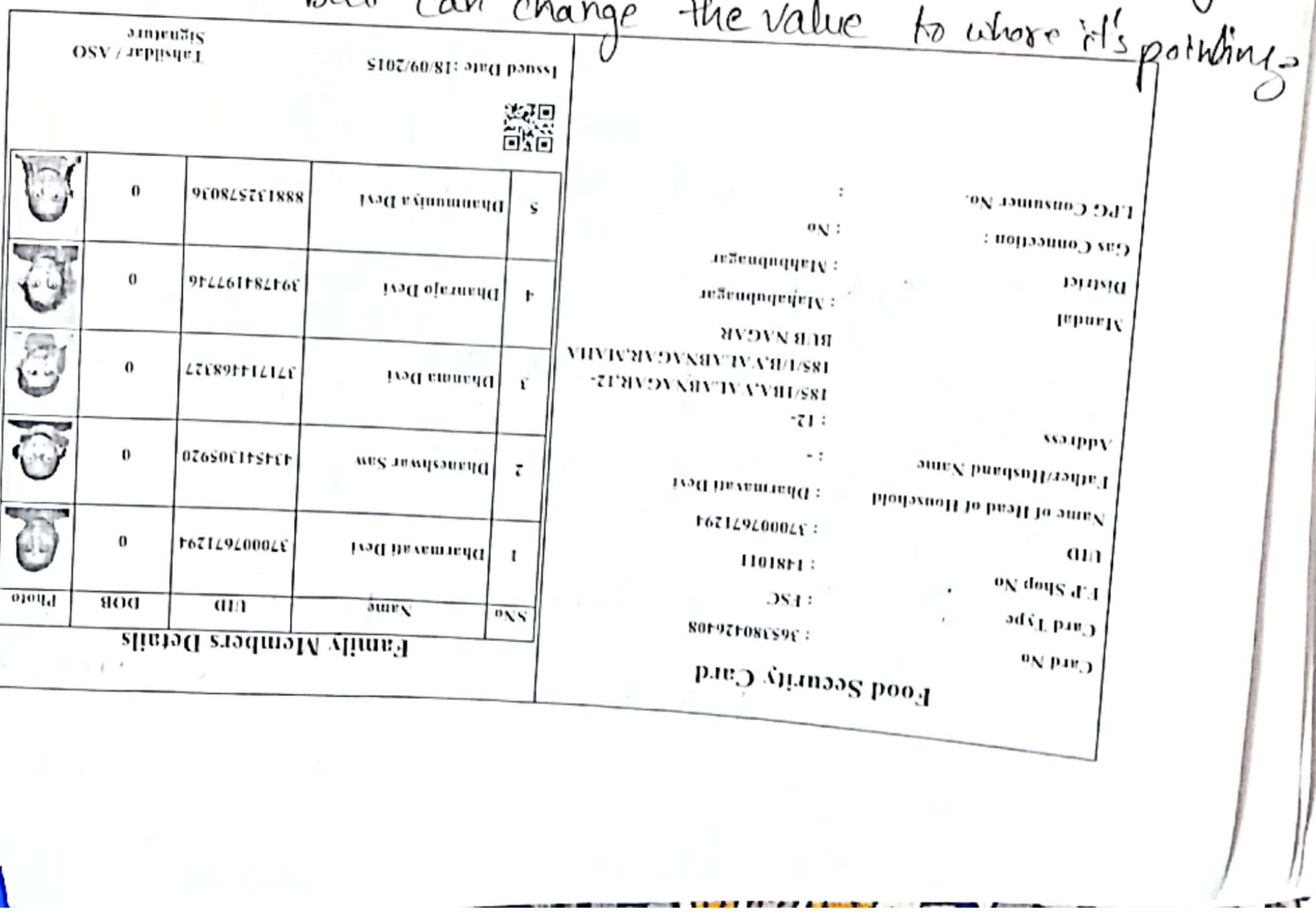
Meaning:- "p is pointer to constant char"

⟹ means value pointed by p cannot be changed but where ptr is pointing itself can be changed.

→ Case 2:- ~~const~~ char * const ptr;

Meaning:- ptr is constant pointer to char.

⟹ you cannot change where it's pointing but can change the value to where it's pointing.



→ Case 3 :- const char *const ptr;

Meaning:- ptr is constant pointer to constant char

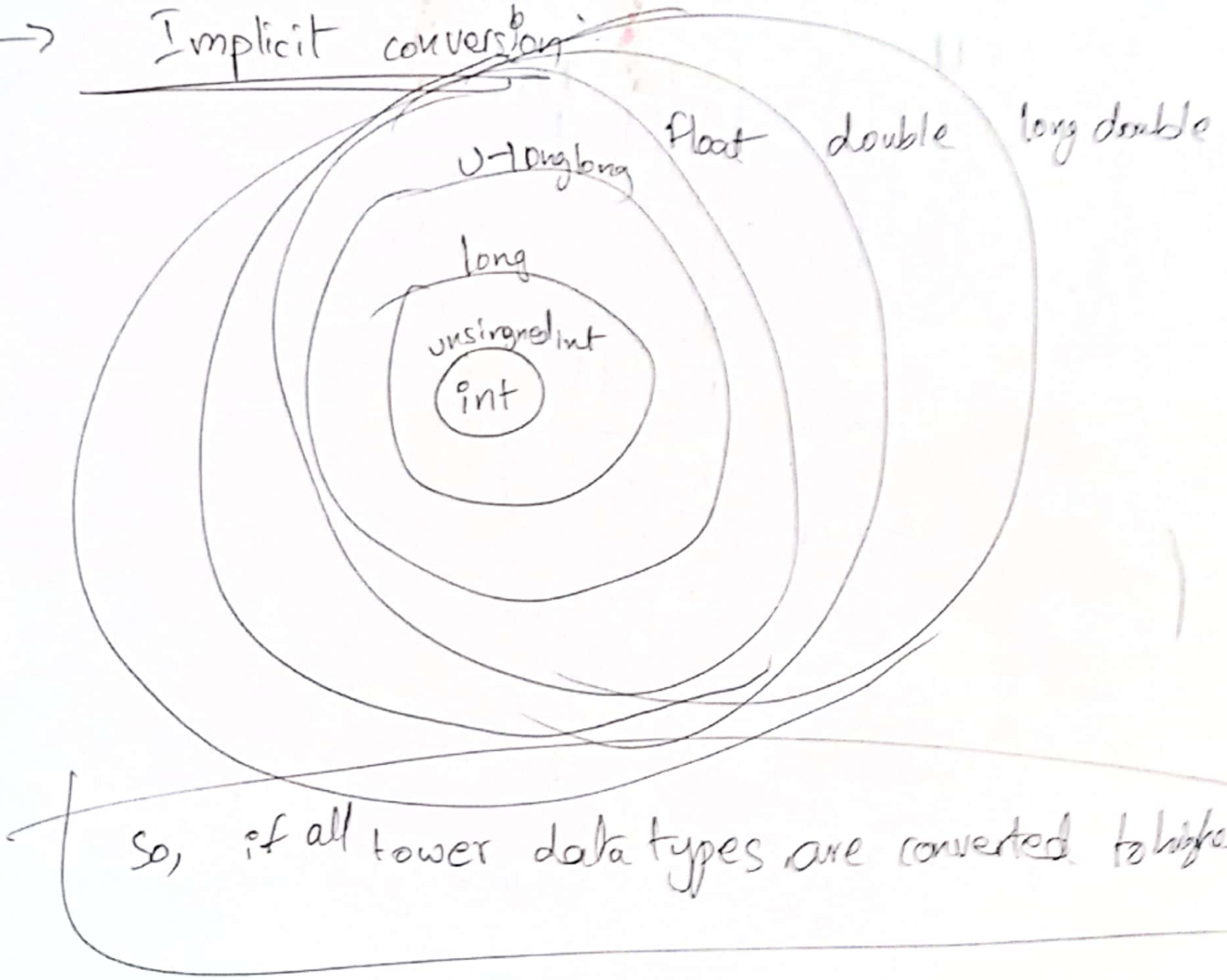
⟹ Cannot change either.

---

* int * ptr means it points to a integer yet it's size is const ie 4 Bytes as it contains only address i.e 32bits

C tips

→ Implicit conversion



So, if all lower data types are converted to higher

→ if (ch = 0) => if (false)

→ Prefix

0x => Hexa

0 => Octal

Default => Decimal

→ ~~Follows BODMAS~~

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→ Operator Precedance

PUMA'S REBL TAC

- P → Postfix ([ ] (++ --) ( ) (.) (->))
- U → Unary
- M → Multiplicative
- A → Additive
- S → ~~Subtractive~~ Shift
- R → Relational
- E → Equality
- B → Bitwise
- L → Logical
- T → Ternary
- A → Assignment
- C → Comma

UTA are right to left

Associativity = When same priority follow direction usually left to right

Food Security Card

Card No	: 365380426445
Card Type	: FSC
F.P Shop No	: 1481011
UID	: 968943768797
Name of Head of Household	: Aruna Devi
Father/Husband Name	: -
Address	: 12-125/4/C.RAMNAGAR.12-125/4/C.RAMNAGAR.MAHABUBNAGAR
Mandal	: Mahabubnagar
District	: Mahbubnagar
Gas Connection :	: No
LPG Consumer No.	:

2 9 3 2 0 0 0

Family Members Details

SNo	Name	UID	DOB	Photo
1	Aruna Devi	968943768797	0	
2	Arun Kumar Singh	230689492859	0	
3	Arun Kumar Singh	868619133587	0	
4	Arun Kumar Singh	351892987392	0	
5	Arun Kumar Saw	889734335575	0	

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1010
10100

→ sizeof(string) => \0 included
but strlen(sting) => \0 excluded

→ \b => backslash => backspace

→ **ASCII :-** a = 97 , A = 65
'0' = 48.

→ **Union Sizes consumed**

Union :- Max of all
struct :- Sum of all

→ int a, c=2, d=5, e=10
a = c>1 ? d>1||e>1 ? 100 : 200 : 300
// a = 100
~~// Consider for~~

// c>1 ? d>1||e>1 ? 100 : 200 : 300

cond^n

~~Ha~~ >1 <1

=>

→ If consider float i= 0.125

0.125 x 2 ⇒ 0.250 x 2 ⇒

x 2

0.5

x 2

1.0

it ends with 0 decimal sometoher but take 0.1 or 0.15, it never does.

→ If a variable is declared globally and locally, then it first considers the local value than the global, unless local is not assigned to any value.

→ If two cases are same in switch :-
It returns error.

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2-15

Food Security Card

Card No : 36530802644 4

Card Type : FSC

F.P Shop No : 148101 1

UID :

Name of Head of Household : -

Father/Husband Name : -

Address : 12-92/8, RAMNAGAR, MAHABUB NAGAR.

Mandal : Mahbubnagar

District : Mahbubnagar

Gas Connection : No

LPG Consumer No. :

Family Members Details

SNo	Name	UID	DOB	Photo
1	Bachchan Ramat	771944362920	0	
2	Baccha Sam	992643416011	0	
3	Baby Devi	580772203044	0	

→ & any increment in sizeof() will not happen

→ Structure vs Union

Allocate memory for each data type seperate

Allocate max req memory for all datatypes.

→ continue should only be present in a loop.

→ print(3 + "goodbye");
// out = dbye

→ prototype = declaration

→ Short Circuit Nature of operators

& ~~if(x>0) && (++j>0)~~

x>0 && ++j>0

So, if x>0 is False, then RHS of && is NOT Evaluated, So, ++j will not be performed.

Food Security Card

Card No	: 365380426443
Card Type	: FSC
F.P Shop No	: 1481011
UID	: 812812875345
Name of Head of Household	: Arti Devi
Father Husband Name	: -
Address	: 12-125/4/B,RAMNAGAR,12-125/4/B,RAMNAGAR MAHAB UBNAGAR
Mandal	: Mahabubnagar
District	: Mahbubnagar
Gas Connection :	: No
LPG Consumer No.	:

Family Members Details

SNo	Name	UID	DOB	Photo
1	Arti Devi	812812875345	0	
2	Arun Kumar	492537581758	0	
3	Arjun Sah	879407154673	0	
4	Arti Ravidas	228274266679	0	
5	Arun Kumar Saw	672638245974	0	

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→ even if staticity = 0 is given, it won't be re-initialized to 0 in next function call.

→ a = 1, 2, 3; ⇒ a = 1

b = (1, 2, 3); ⇒ b = 3

i = ((5, (i=3)), i=1) ⇒ i = 1

→ # turns the arg into a string

→ '\' is escape character

→ local variable stored in Stack

→ int p:4; ⇒ p usually take 2 bytes = 16 bits but here it limits to 4 bits

Ex: int p:3; p = 5 ⇒ output p=5

101

00
01 -1 00 +1
10
11

int m:2; m = 5 ⇒ m = 01 = 1

101

int c:3; c = -6 ⇒ c = 2

1010

→ enum { a=3, b, c, d=9, e, f }

⇒ 3 4 5 9 10 11

→ printf returns no of chars printed &
scanf returns no. of chars scanned (% count)

→ Static should be declared as a ~~const~~ literal like (0, 10, 2, 5)

→ switch(i){ case 0: i+=5; break;
case 1: i+=4; break;
:
:
}

If we remove the "break" then it executes all below statement even without check

Food Security Card

Card No : 365180426441
Card Type : PHC
F.P Shop No : 148101
UID : 224233749823
Name of Head of Household : Uma Devi
Father Husband Name : -
Address : 12-125/6/R.RAMNAGAR,L2-125/6/R.RAMNAGAR,MAHAB
LRNAGAR
Mandal : Mahabnagar
District : Mahabnagar
Gas Connection : No
LPG Consumer No. :

Family Members Details

SNo	Name	UID	DOB	Photo
1	Uma Devi	224233749823	0	
2	Umesh Bhar	246020328125	0	
3	Triveni Singh	762243776681	0	
4	Tunjee Kumar	275575809244	0	
5	Tulani Thakur	218695076601	0	

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$(b+2)[3] = b[5]$