

Programming with C I

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Linked Lists

➤ **linked list**

- a sequence of nodes in which each node but the last contains the address of the next node

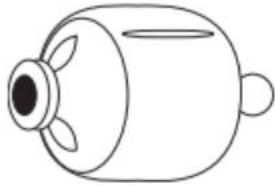
➤ **empty list**

- a list of no nodes
- represented in C by the pointer NULL.

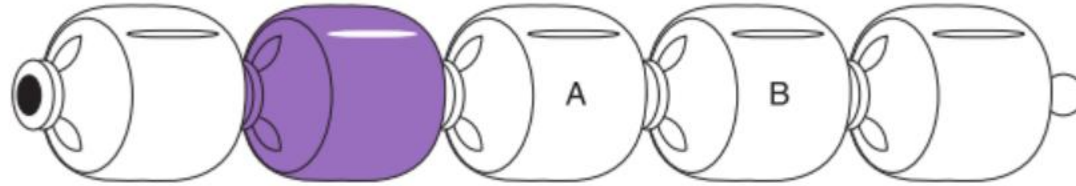
➤ **list head**

- the first element in a linked list

Figure Children's Pop Beads in a Chain



Pop bead



Chain of Pop beads

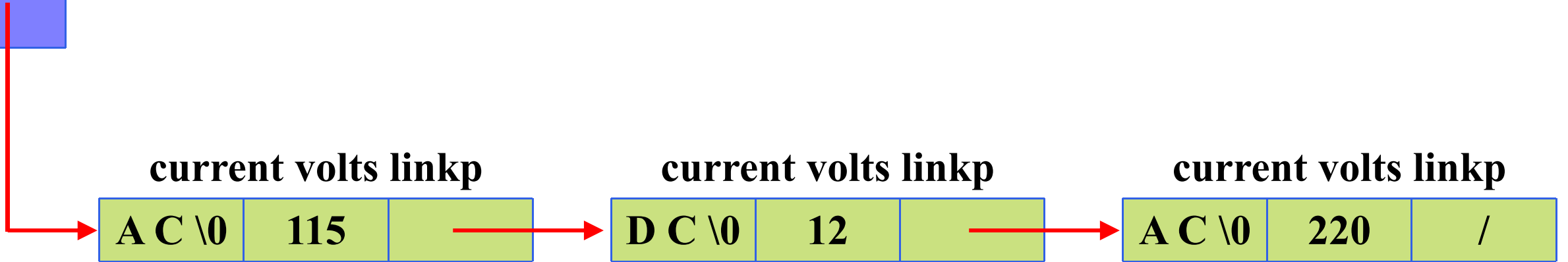
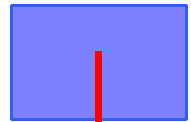


Figure Multiple Pointers to the Same Structure

```
node_t *n1_p, *n2_p, *n3_p;  
n1_p = (node_t *)malloc(sizeof (node_t));  
strcpy(n1_p->current, "AC");  
n1_p->volts = 115;  
n2_p = (node_t *)malloc(sizeof (node_t));  
strcpy(n2_p->current, "DC");  
n2_p->volts = 12;  
n3_p = n2_p;
```

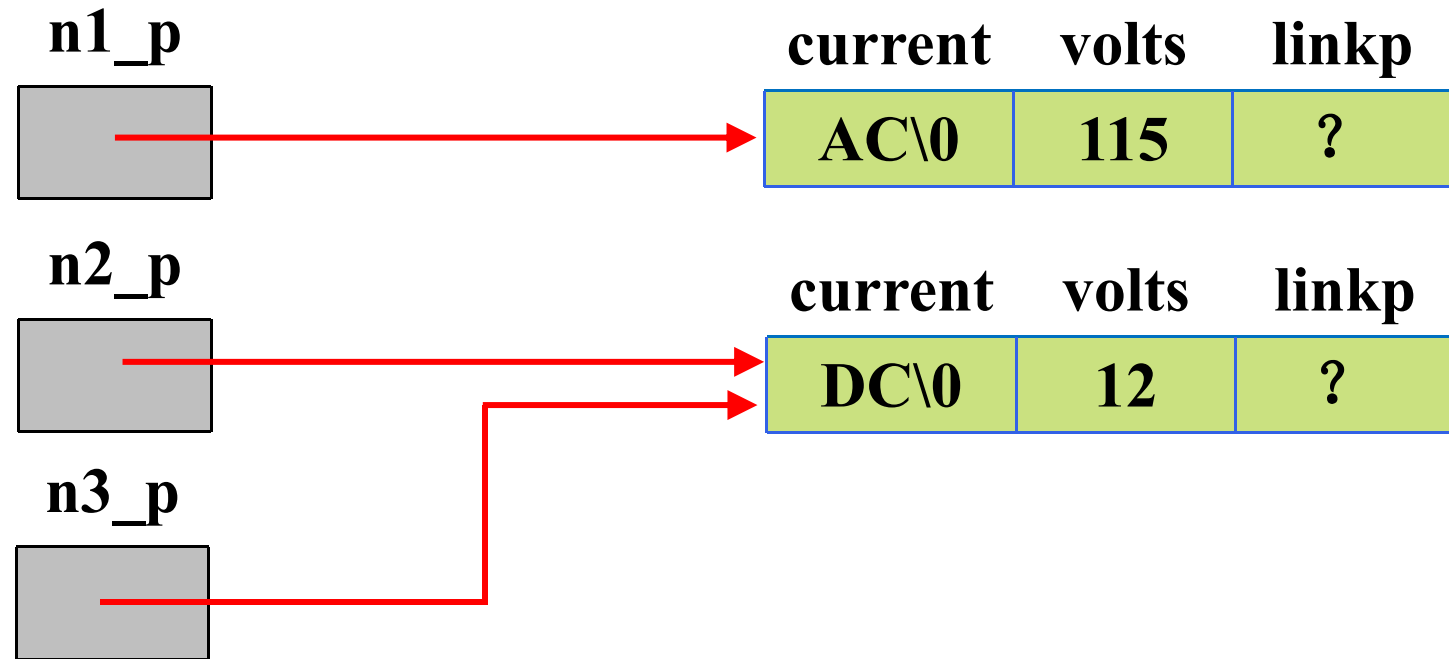


Figure Linking Two Nodes

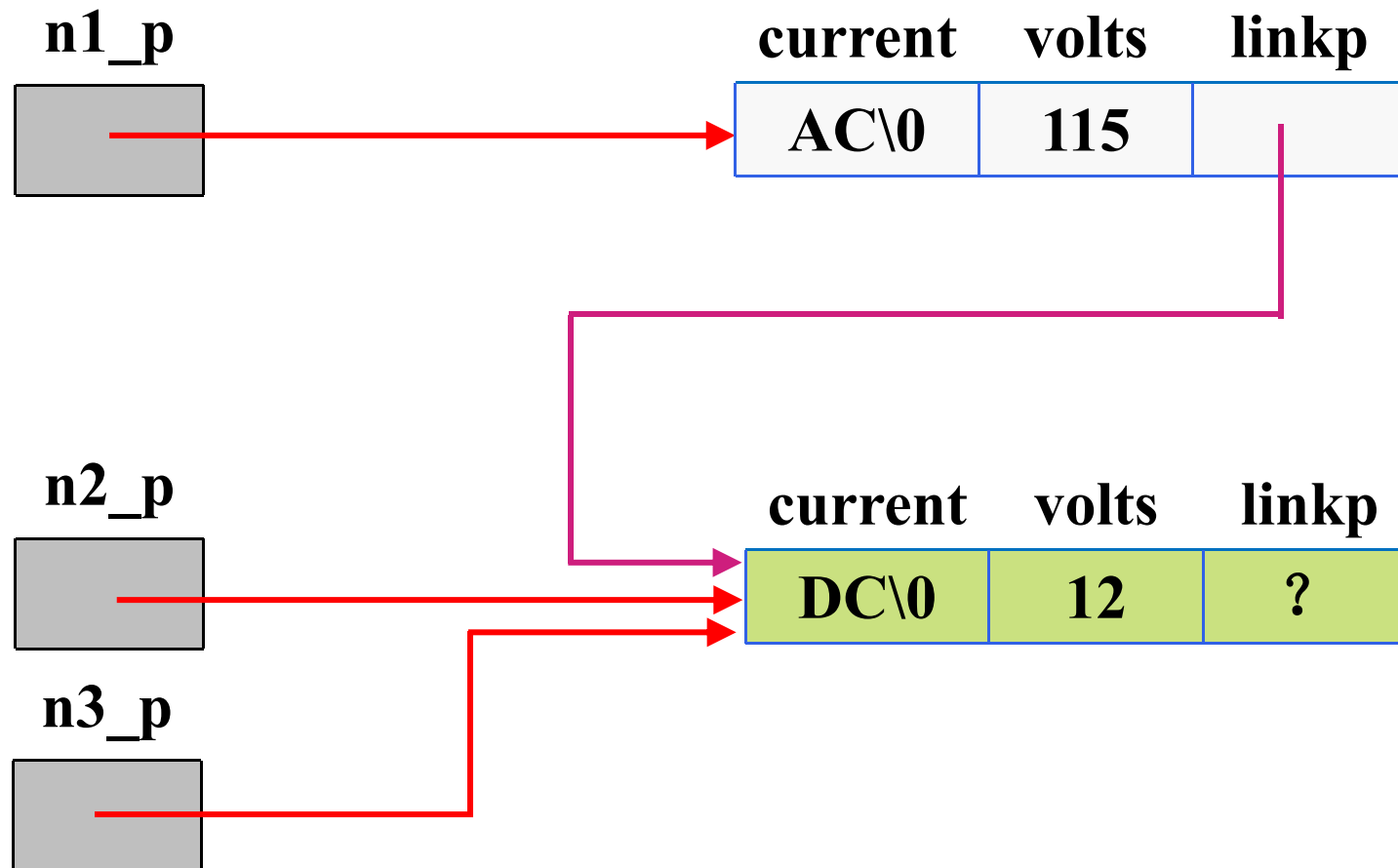


Table Analyzing the Reference n1_p->linkp->volts

Section of Reference	Meaning
n1_p->linkp	Follow the pointer in n1_p to a structure and select the linkp component
linkp->volts	Follow the pointer in the linkp component to another structure and select the volts component.

Figure Three-Node Linked List with Undefined Final Pointer

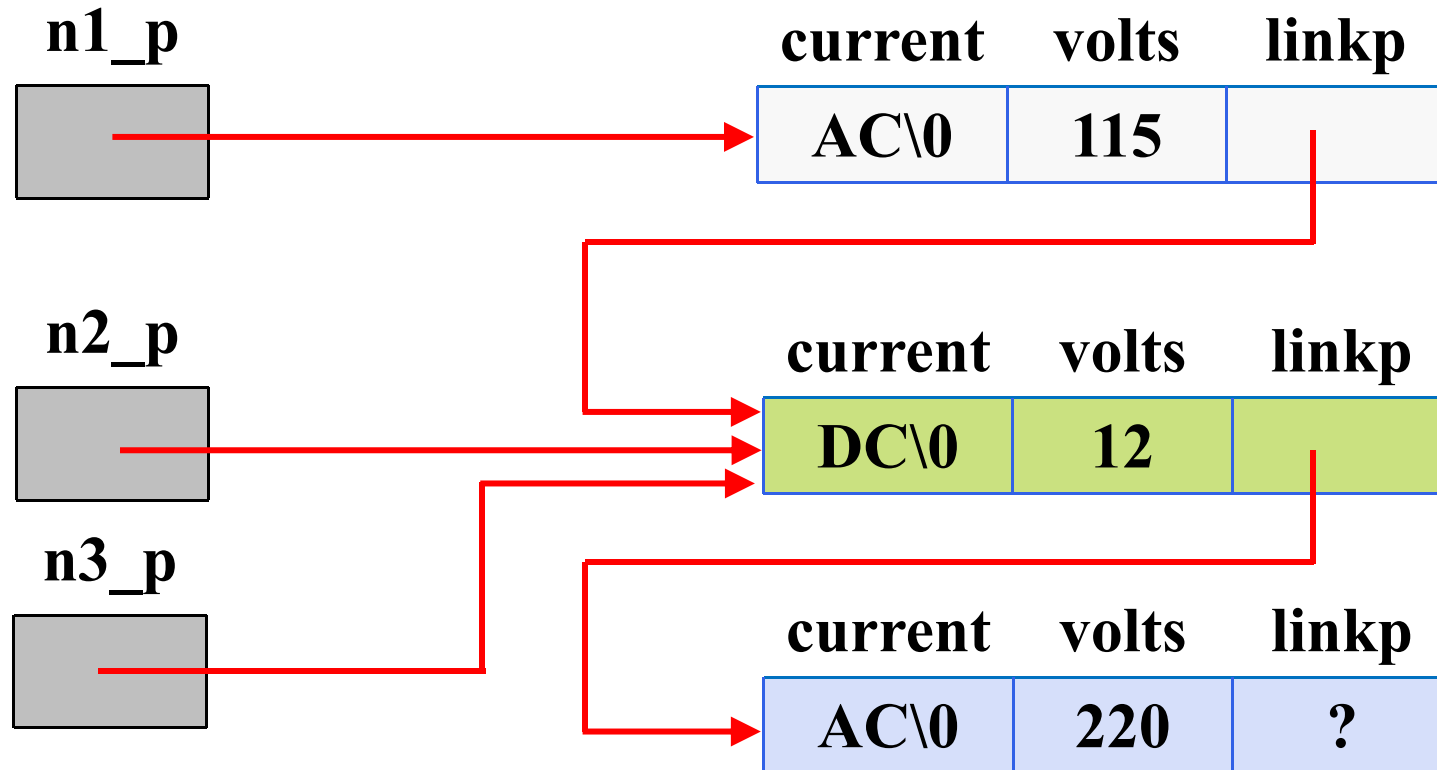
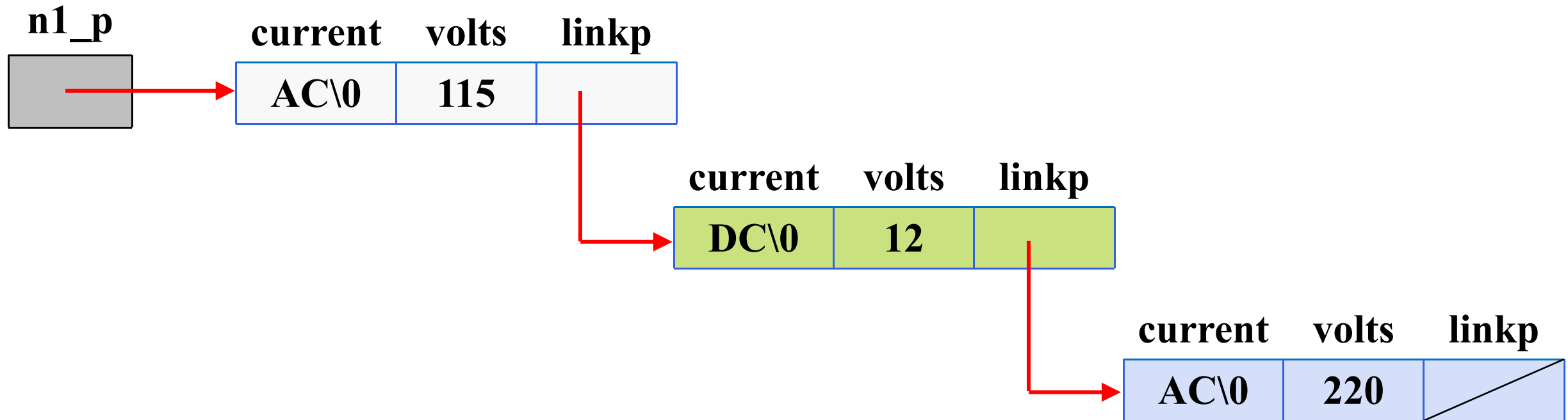


Figure Three-Element Linked List Accessed Through n1_p




```
digit* create_new_digit(int d) {  
    digit* new = (digit*) malloc(sizeof(digit));  
    new->d = d;  
    new->next = NULL;  
    return(new);  
}
```

```
int main(void) {  
    digit* head;  
    head = create_new_digit(1);  
    head->next = create_new_digit(2);  
    head->next->next = create_new_digit(3);  
}
```

Stack memory

```
main  
    digit* head: ??  
create_new_digit  
    int d: 1  
    digit* new:
```

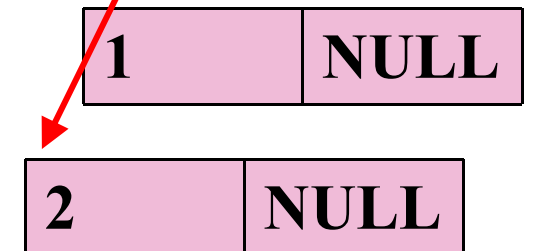
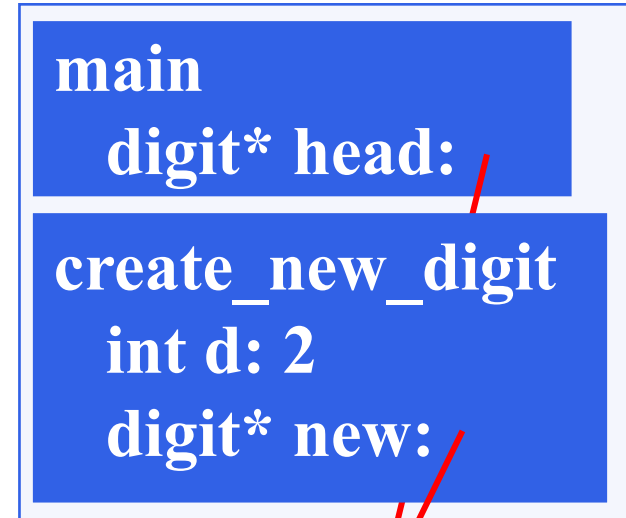
1	NULL
---	------

Heap memory

```
digit* create_new_digit(int d) {  
    digit* new = (digit*) malloc(sizeof(digit));  
    new->d = d;  
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}
```

```
int main(void) {  
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Stack memory

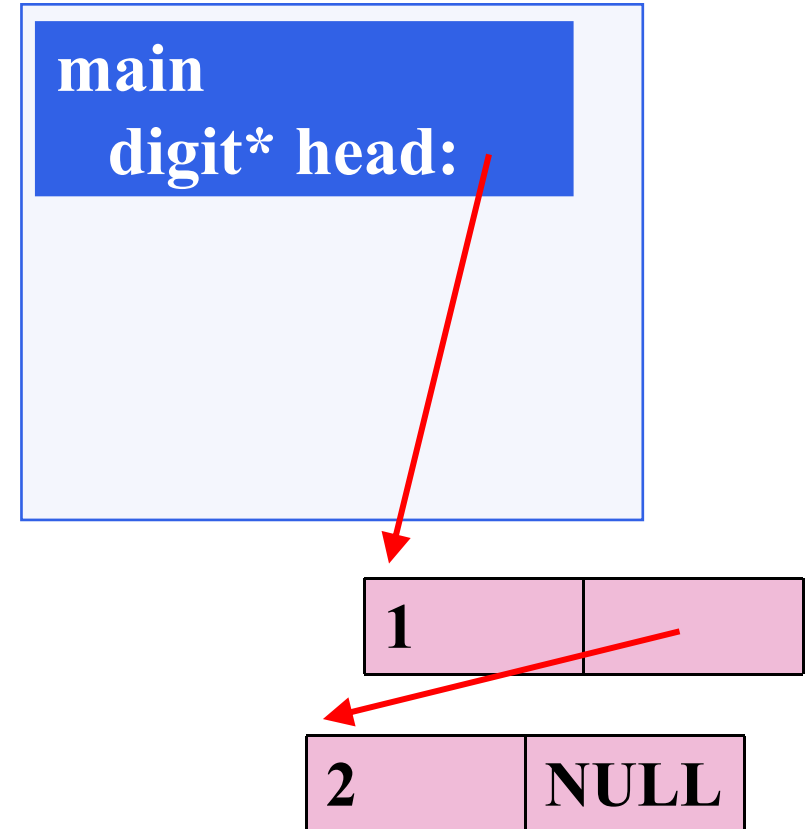


Heap memory

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Stack memory

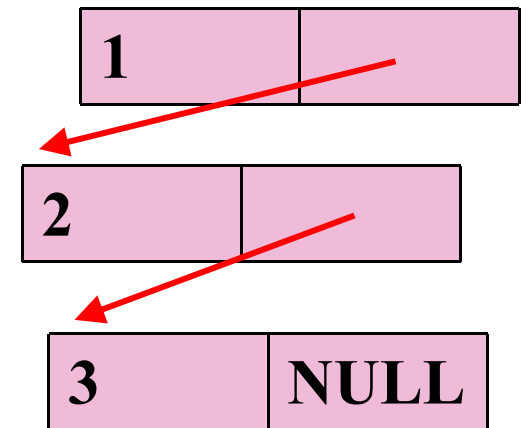
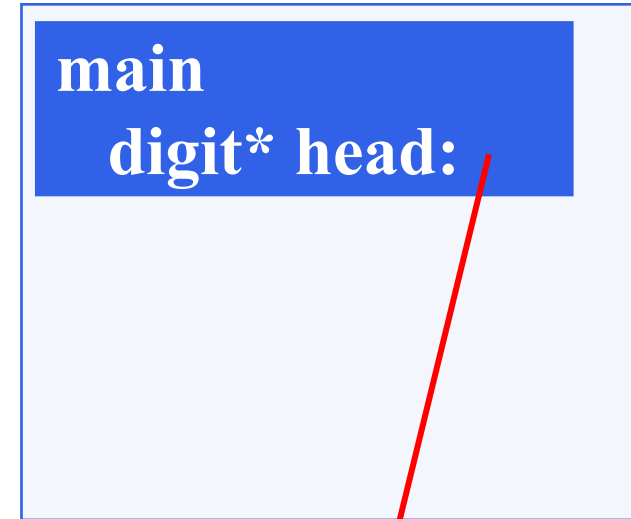


Heap memory

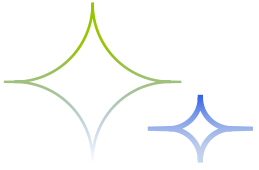
```
digit* create_new_digit(int d) {  
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Stack memory



Heap memory



THE END

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