MONTANA
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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

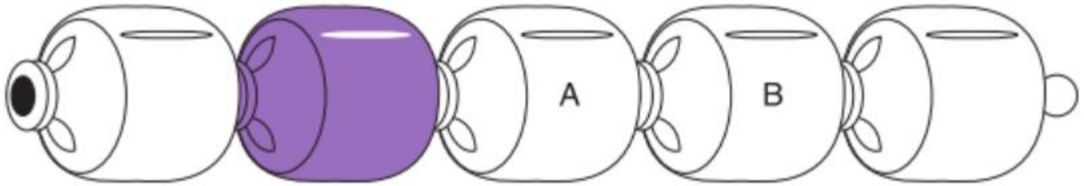
- a list of no nodes
- represented in C by the pointer NULL.

list head

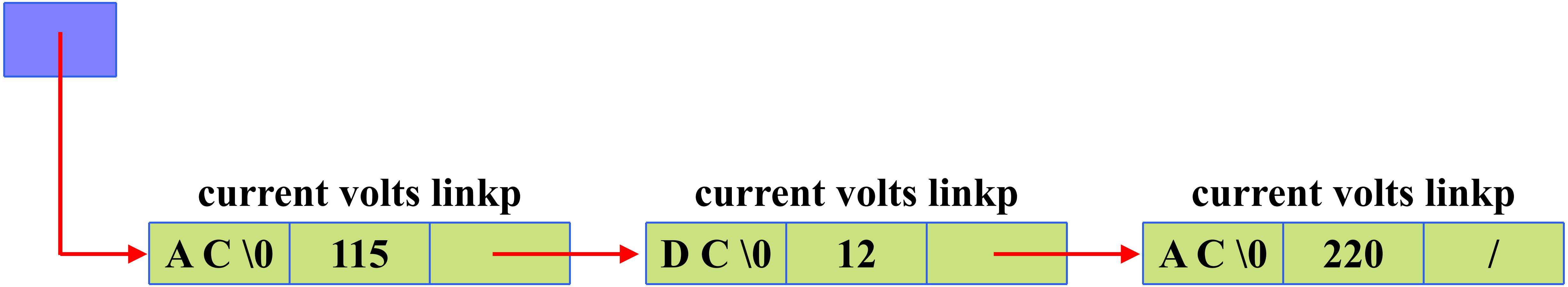
- the first element in a linked list

Figure Children's Pop Beads in a Chain

Pop bead



Chain of Pop beads



current volts linkp

A C \0 | 115 |

current volts linkp

D C \0 | 12 |

current volts linkp

A C \0 | 220 | /

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;
```

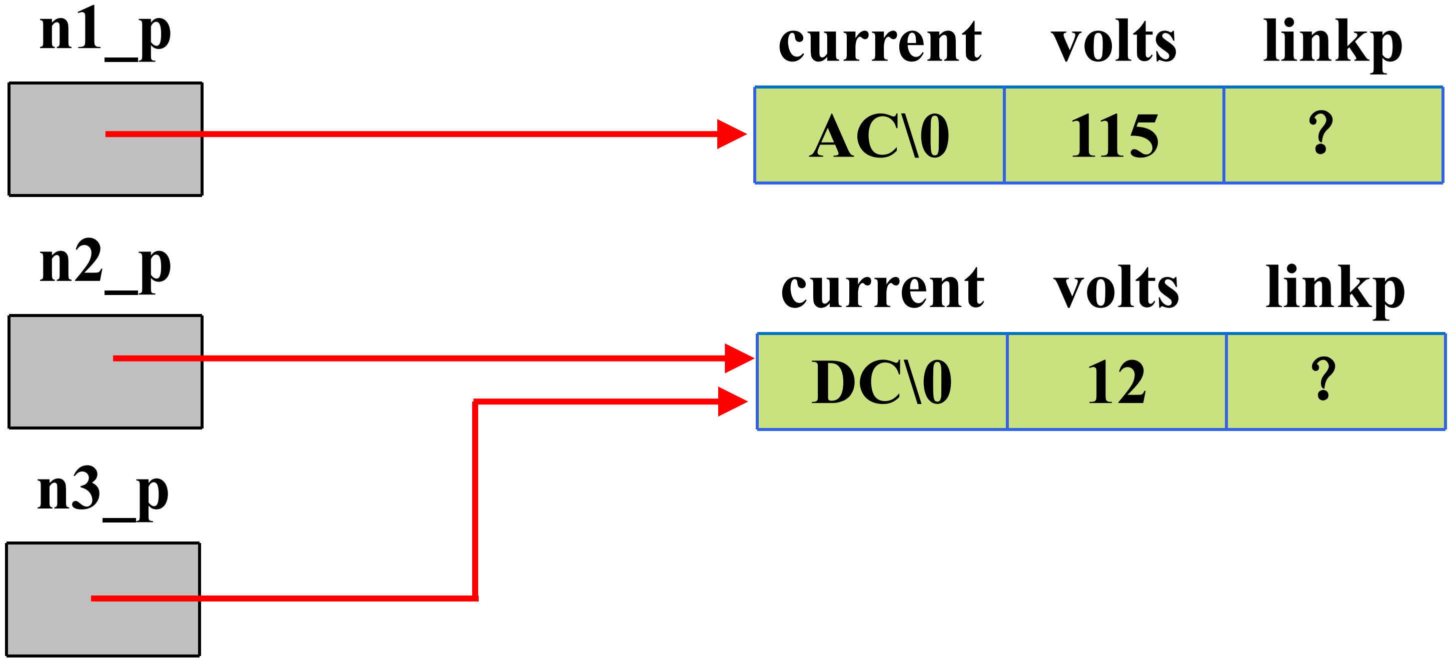


Figure Linking Two Nodes

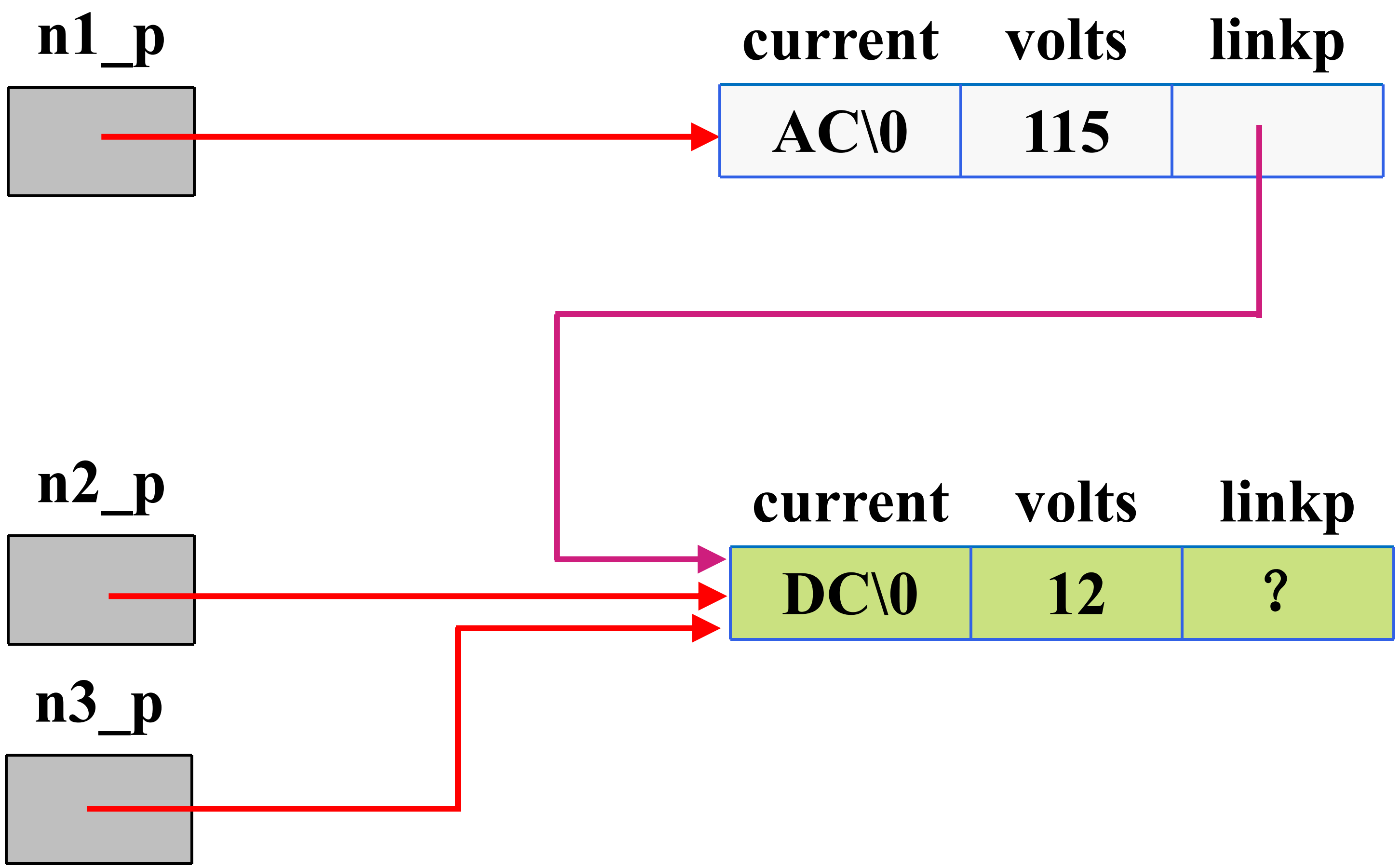


Table Analyzing the Reference n1_p->linkp->volts

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

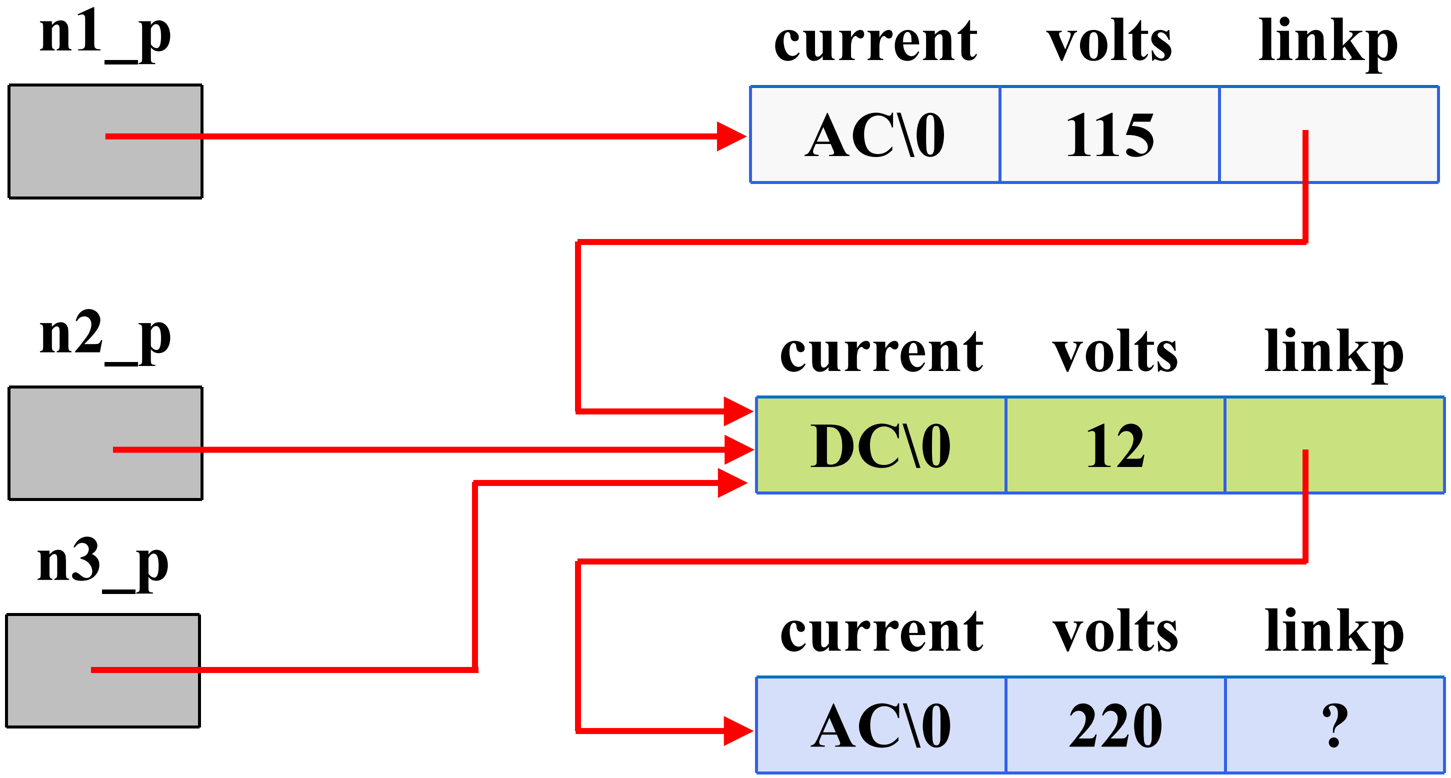
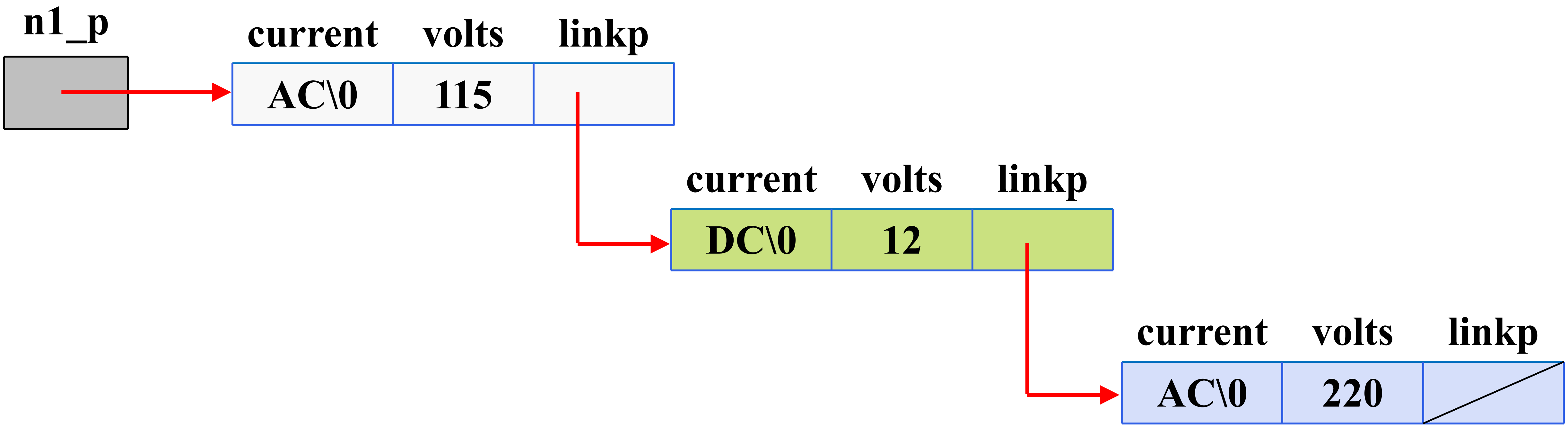


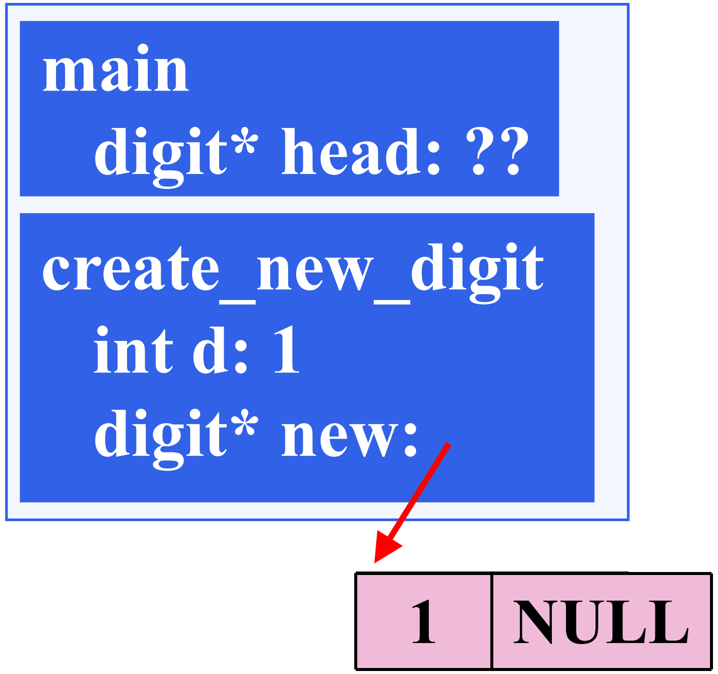
Figure Three-Element Linked List Accessed Through n1_p



```
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;
    new->next = NULL;
    return(new);
}

int main(void) {
    digit* head;
    head = create_new_digit(1);
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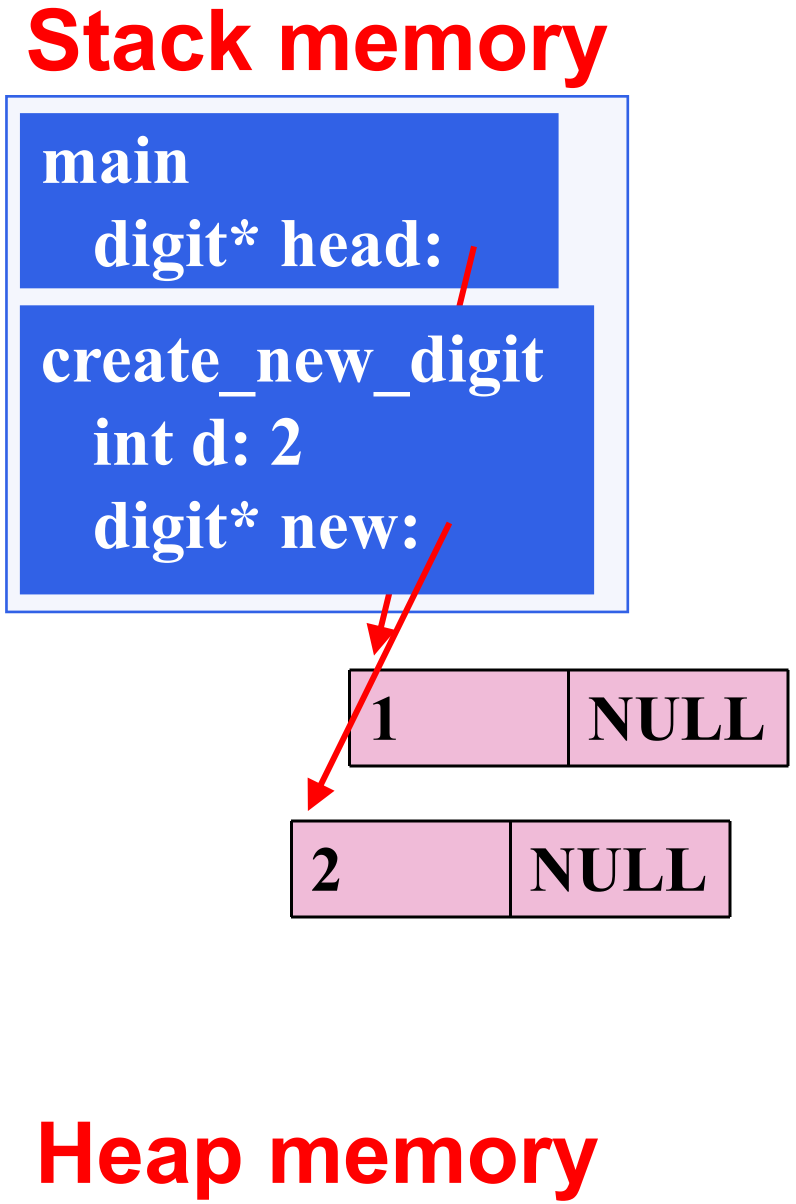

```
digit* create_new_digit(int d) {
    digit* new = malloc(sizeof(digit));
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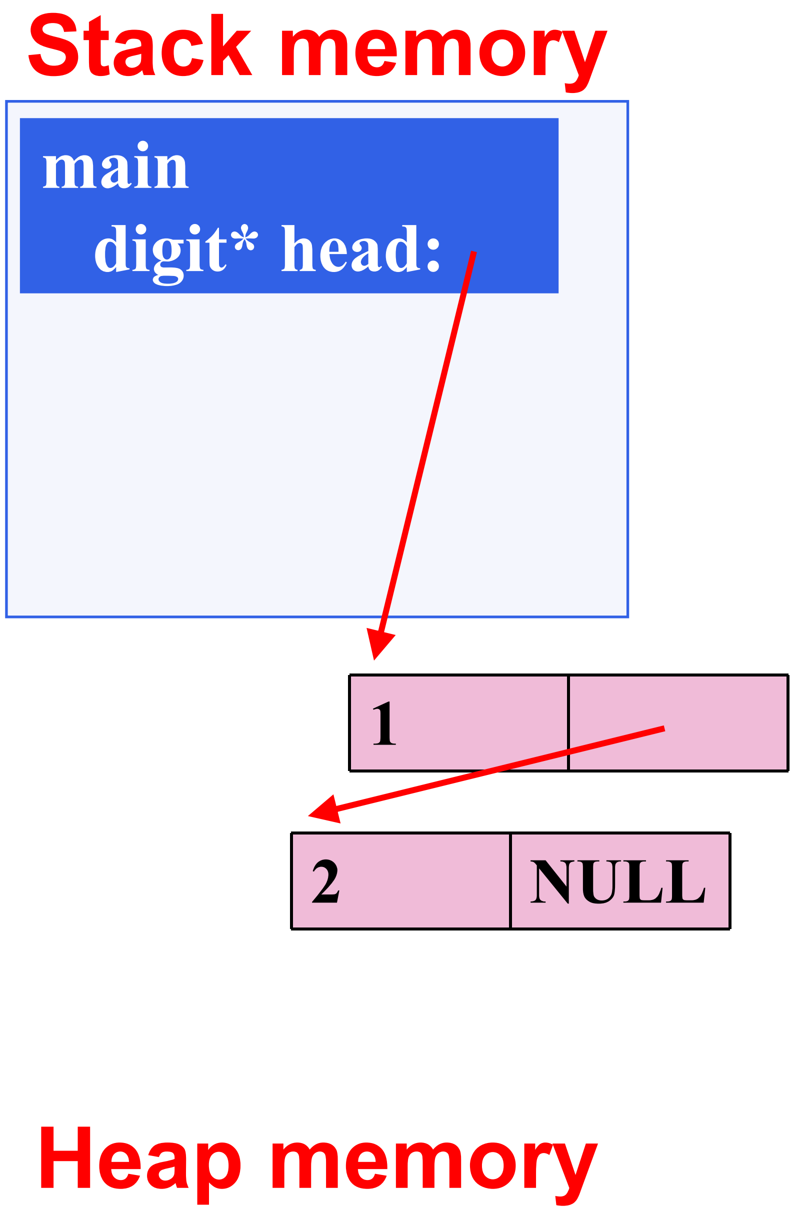

Stack memory

main

digit* head:

1

2

NULL

Heap memory

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

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

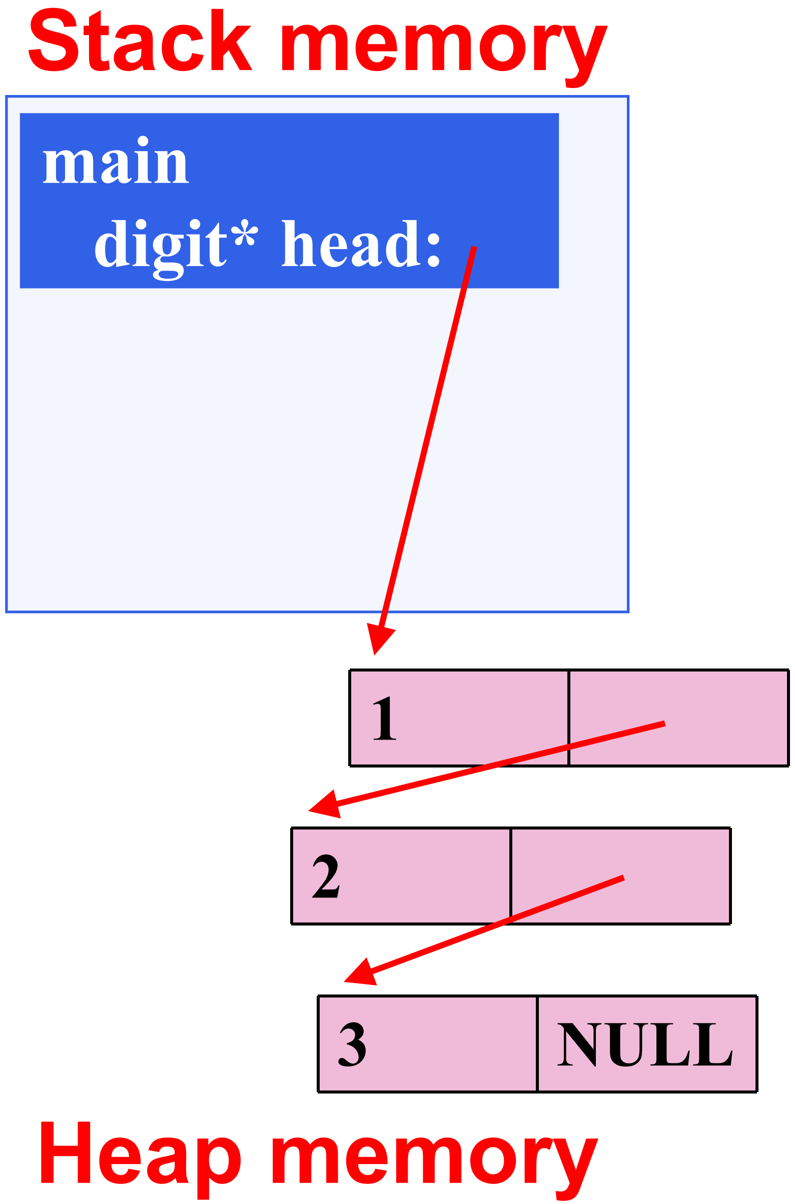

THE END

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