

# Memory Management

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# Arrays

- Fixed size

```
int a[10];
```

- Can we allocate a variable size array based on user input

- Use `malloc`
- Dynamic memory allocation
- Prototype

```
void *malloc(size_t n)
```

# malloc

```
#include<stdlib.h>
```

```
#include<stdio.h>
```

```
main( )
```

```
{  
    int n, *a, i;  
    scanf("%d", &n);  
    a = (int*) malloc (sizeof(int)*n);  
    for (i = 0; i < n; i++)  
        a[i] = i;  
    for (i = 0; i < n; i++)  
        printf("%d\n", a[i]);  
    free(a);  
}
```

# 2-D Arrays using malloc

```
main()  
{  
    int m, n, **a, i, j;  
    scanf("%d", &m);  
    scanf("%d", &n);  
    a = (int**) malloc (sizeof(int*) * m);  
    for (i = 0; i < m; i++)  
        a[i] = (int*) malloc (sizeof(int) * n);  
    for (i = 0; i < m; i++)  
        for (j = 0; j < n; j++)  
            a[i][j] = i*j;  
    for (i = 0; i < m; i++)  
        free(a[i]);  
    free(a);  
}
```

# Memory Layout of a C Program

