

Arrays

1 Creating an Array

Suppose we wanted to store 100 scores. One might try to declare 100 variables, say `score0 ... score99`. However, it is much better to define an array.

An array is a collection of variables of the same type. These values are accessed by an *index*, also called *subscript*. The declaration

```
float score[100];
```

creates an array with 100 values: these are `score[0]` through `score[99]`. The 0 and the 99 are the index/subscript. Note that a C array always starts at 0.

An array value can be used wherever a normal value is used. Here is code to calculate the sum of the above array:

```
float total = 0.0;
for(int i=0; i<100; i++) {
    total += score[i];
}
```

Like a normal variable, an array needs to be initialized before use. For example, one might write:

```
const int NUM_VALS = 20;
int count[NUM_VALS];
for(int j=0; j<NUM_VALS; j++)
    count[j] = 0;
```

to set all the values in the array to zero.

Occasionally, an array can be initialized at declaration:

```
char legalGrades[6] = { 'A', 'B', 'C', 'D', 'F', 'I' };
```

Note that C does no range checking: you must ensure that the index is valid.

2 Sample program: `arrayed.c`

Here is code that reads an array from the user, then prints the array, and then determines whether every entry in the array is the same or not.

```

// read an array of 10 integers and check if all the same
#include <stdio.h>

int main(void)
{
    // define and get array
    const int SIZE=10;
    int A[SIZE];
    printf("Enter %d values\n", SIZE);
    int i;
    for(i=0; i<SIZE; i++)
        scanf("%d", &A[i]);

    // echo array
    printf("You entered: ");
    for(i=0; i<SIZE; i++)
        printf("%d ", A[i]);
    printf("\n");

    // check for sameNess
    int allAreSame=1;
    for(i=0; i<SIZE-1; i++) { // note where loop stops
        if( A[i]!=A[i+1] ) {
            allAreSame=0;
        }
    }
    if( allAreSame )
        printf("Same\n");
    else
        printf( "not-same\n" );

    return 0;
}

```

Practice Change the above program to test whether the input numbers are consecutive or not (rather than whether they are all the same).