

array Name

num

index	0	1	2	3	4
value	10	15	20	25	53

// define an array

int num[5]; // length

num[1]; // value of element
w/ index 1

Arrays and functions

- Arrays can be passed as parameters to functions
 - Formal array parameters must have an empty []
`void myArrayFunction(int one, int many[]);`
 - An array parameter is used just like an array local variable
 - But, arrays are implicitly **passed by reference**!
 - All changes to an array parameter change memory outside the function scope
 - You **never** would have a formal parameter `int &many[]`

Arrays and functions

- When calling a function with an array parameter:
 - You must provide an array variable for that parameter
 - It will be passed in by reference
 - Syntax: just the variable name, like any other parameter
 - Note the difference syntax for the formal parameter vs. the actual parameter

```
int my_function( int param[] );
```

```
...
```

```
int x, array_var[20];
```

```
x = my_function(array_var);
```

Arrays and functions

- Four different array syntaxes
 - Declaration
 - `int y[50]`
 - Subscript notation to specify the size / length of the array
 - Accessing an element
 - `y[20]`
 - Subscript notation to specify the *index*
 - Formal parameter
 - `y[]` // define / declare a function parameter
 - Must tell the *function* that the parameter is an array (not a regular variable)
 - Actual parameter
 - `int y;` // a variable
 - `y;` // the value of the variable `y`;
 - No additional information necessary

array names:

names

index	0	1	2	3	4	5	6
value	Vicky	Donald	Lucy	Jack	Mike	Katy	Bob

IDs	0	1	2	3	4	5	6
index							
value	1111	1121	1321	4321	4132	4131	4211

kpz [0]
names [0]
IDs [0]

} Same person vicky

kpz	0	1	2	3	4	5	6
index							
value	9				8		

Using Arrays in Parallel

- Data is often organized along more than one *dimension*
 - This is why spreadsheets are so useful
 - Rows represent entities
 - Columns represent information
- How would you represent this data in a C++ program?

0	1	2	3	4
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Ed	John	Peter	Mary	Pedro
99	100	100	100	98

name_array[1] ⇔ John

lab1[1] ⇔ the grade of lab 1 for John

	A	B	C	D
1	student id	lab1 score	lab2 score	
2				
3	u307780	95	66	
4	u675421	99	84	
5	u418245	91	97	
6	u105767	57	80	
7	u665907	72	86	
8	u957906	71	86	
9	u878762	60	97	
10	u120275	36	73	
11	u605893	77	87	
12	u660981	39	33	
13	u568151	36	58	
14	u900906	75	44	
15	u592930	74	43	
16	u319177	69	34	
17	u491202	32	81	
18	u359348	30	67	
19	u630760	87	84	
20	u103412	78	84	
21	u436856	84	68	
22	u899514	99	95	
23	u720524	90	32	
24	u421949	58	57	
25	u486141	48	30	
26	u859146	43	43	
27				

Using Arrays in Parallel

- Data is often organized along more than one *dimension*
 - This is why spreadsheets are so useful
 - Rows represent entities
 - Columns represent information
- How would you represent this data in a C++ program?
 - A 2-dimensional array
 - Limited to one data type (int)
 - 3 arrays used in parallel
 - Can have different column types

	A	B	C	D
1	student id	lab1 score	lab2 score	
2				
3	u307780	95	66	
4	u675421	99	84	
5	u418245	91	97	
6	u105767	57	80	
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Using Arrays in Parallel

- Declare three arrays of the same length
 - string id[24];
 - int lab1[24];
 - int lab2[24];
- The values for a row are found at the same position/index in the three arrays
 - Row 10 ID: id[9]
 - Row 10 lab1 score: lab1[9]
 - Row 10 lab2 score: lab2[9]

	A	B	C	D
1	student id	lab1 score	lab2 score	
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3	u307780	95	66	
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Example: employee data

- For each employee, we have:

- Name
- Position
- Review score
- For example, in our text file:

peter	manager	86
michael	developer	68
samir	developer	75
lumbergh	vp	82

1. Declare variables to hold the data
2. Read from the file into the variables
3. Print out the data