



# Arrays 2(Chapter 8.1,8.5)

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- Multidimensional arrays
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# Multidimensional Arrays

- Storing scores on 5 tests for a class of 30 students
- Storing a 200x200 picture
- Storing the words in a paragraph
- Storing data on 2000 employees

# Tables of Numbers

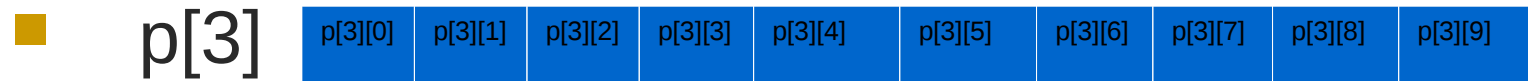
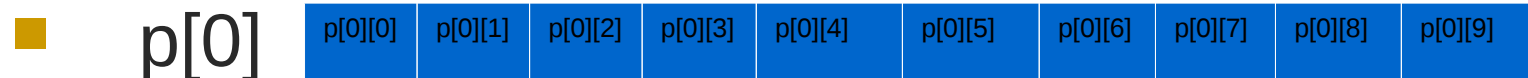
- `int test[5][30];`
- `//allocate five arrays of 30 integers`
- `Test[2][20]` is the score of the 20<sup>th</sup> student on test two
- ```
double average;
for (i=0; i<30; i++){
    average=0;
    for (j=0; j<5; j++) average += test[j][i];
    cout << "The test average for student << i <<
        "is " << average/5;
}
```

# Array Storage

- `double p[5][10] //5 arrays of 10 doubles`



- `p[0],p[1]....,p[4]` are the arrays



- `char p[3][2]={{'a','b'},{'c','e'},{'w','A'}};`

- `Double smallest(double p[][10]);`

- `void myfunction( char p[][2] );`

# Storing an Image

- `char w[5][10][3]` allocates a 5x10 table of 3 characters

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| w[0][0] | w[0][1] | w[0][2] | w[0][3] | w[0][4] | w[0][5] | w[0][6] | w[0][7] | w[0][8] | w[0][9] |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| w[4][0] | w[4][1] | w[4][2] | w[4][3] | w[4][4] | w[4][5] | w[4][6] | w[4][7] | w[4][8] | w[4][9] |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|

|         |            |            |            |
|---------|------------|------------|------------|
| W[3][1] | w[3][1][0] | w[3][1][1] | w[3][1][2] |
|---------|------------|------------|------------|

- Total 5x10x3 elements.
- Can also be viewed as 5 groups of 10x3 arrays
- What is the location of the character `w[3][2][1]`?

# Words in a Paragraph

- ```
string words[200];  
cout << "type 200 words" << endl;  
for (i=0; i<200; i++)  
cin >> word[i];  
cout <endl <<  
"The last letter of each word is" <<endl  
for (i=0;i<200;i++)  
cout << word[i][word[i].length()-1];
```

# Array of class objects

```
class Baby
{
public:
    Baby();
    Baby(int age,int weight, string name) {
        itsAge = age;
        itsWeight=weight;
        itsName=name;
    }
    ~Baby() {}
    int GetAge() { return itsAge; }
    int GetWeight() { return itsWeight; }
    void SetAge(int age) { itsAge = age; }
    void SetWeight(int weight) { itsWeight = weight; }
    void SetName(string name) { itsName = name; }

private:
    int itsAge;
    int itsWeight;
    string itsName;
};
```

# Array of class objects

```
int main()
{ int age, weight;
  string name;
  Baby newborns[2];
  int i;
  for (i = 0; i < 2; i++)
  { cin >> age;
    cin >> weight;
    cin >> name;
    newborns[i].SetAge(age);
    newborns[i].SetWeight(weight);
    newborns[i].SetName(name);
  }

  for (i = 0; i < 2; i++)
    std::cout << "#" << i << ": " << newborns[i].GetAge() << std::endl;

  return 0;
}
```

## Complete Program

# Dynamic Array Problems

- In general multidimensional arrays cannot be dynamic. That is one cannot define an array as `int myarray[dim1][dim2]`
- Static arrays are hard to pass as function parameters as dimension must be specified. `void myfunction( char p[][2] );`
- Solution use [Boost Library](#)
- Examples [gnplot.h](#), [c1\\_graphB.cpp](#)