

CS180 - Vectors

Note Title

2/23/2011

Announcements

- HW due Saturday
- Review next Monday
- Midterm next Tuesday
- Second program is posted

Vectors (Ch 6.1)

like lists in python

myvector[5] = 6; ←

Extendable: if array is too small,
double it → copy everything]

Time: $O(N)$ time for N insertions

(not $O(1)$ time per operation) ←

Code:

```
template <typename Object >  
class Vector {
```

```
private:
```

```
    Object * _data; // array
```

```
    int _size;
```

```
    int _capacity;
```

Constructor:

Vector () : _Capacity (100), _size (0),
_data (new Object [-capacity]) {}

Operator []:

```
Object operator[](int i) {  
    return ~data[i];  
}
```

(without error checking)
will give a seg fault

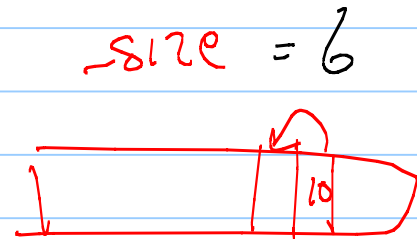
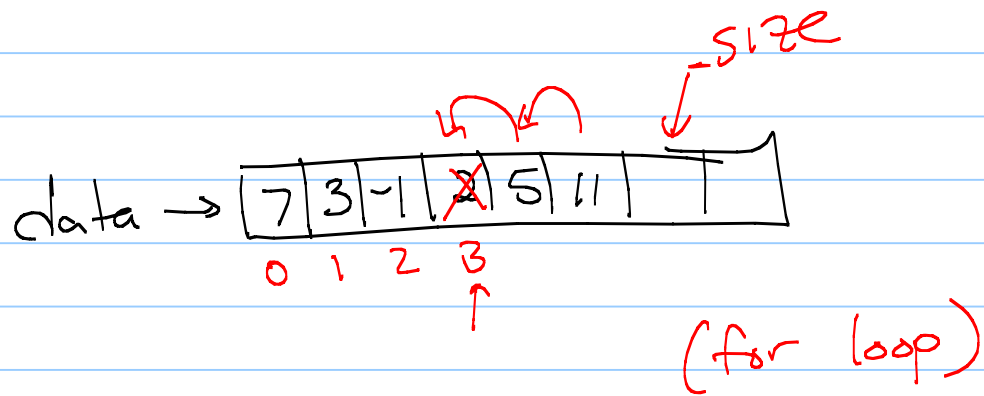
Destructor :

```
~Vector () {  
    delete [] _data;  
}
```

Erase

- Takes an ^{integer} index & deletes that element
(differing from STL)

Ex: `myVec.erase(3);`



Code:

```
void erase (int index) {
```

```
    if (index(index < 0) || (indexindex >= _size))  
        throw runtime_error ("i is out of range");
```

```
    for (int i = index; i < _size - 1; i++)
```

```
        _data [i] = _data [i+1];
```

```
    _size--;
```

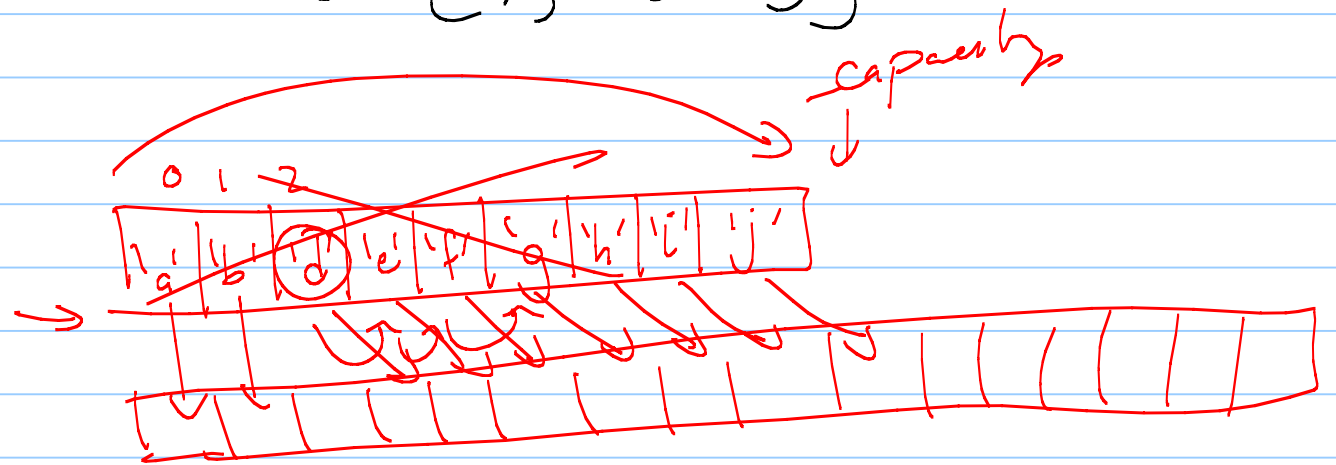
```
}
```


Insert : Examples

```
myVector.insert(2, 'c');
```

```
otherVector.insert(11, "new");
```

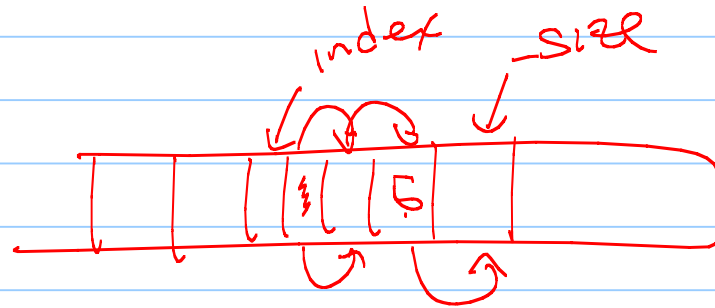
```
anotherVector.insert(7, -25);
```



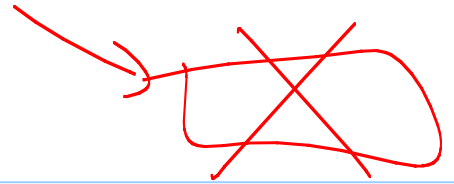
How to insert?

What if it is full?

(see prev)



Code for insert:



```
void insert(int index, Object e) {
    if (_size == _capacity) {
        Object * newData = new Object[2*_capacity];
        for (int i = 0; i < index; i++)
            newData[i] = _data[i];
        newData[index] = e;
        for (int i = index; i < _size; i++)
            newData[i+1] = _data[i];
        delete [] _data;
        _data = newData;
        _capacity *= 2;
    }
}
```

```
else { //life is easy
```

```
    for (int i = _size - 1; i > index - 1; i--)
```

```
        data[i+1] = data[i];
```

```
    } data[index] = e;
```

```
    _size++;
```

```
}
```

Other functions

at

House keeping

erase

[push-back
pop-back