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June 8th, 2004, 03:59 PM

#1

**Andreas Masur**

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Join Date: May 2000

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**C++ General: How to declare and use two-dimensional arrays?****Q:** How can I define a dynamic two-dimensional array?**A:** The following class shows one way of encapsulating a two-dimensional array:

Code:

```
template <class T>
class dynamic_2d_array
{
public:
    dynamic_2d_array(int row, int col) : m_row(row),
                                         m_col(col),
                                         m_data((row != 0 && col != 0) ? new T[row * col] : NULL){}

    dynamic_2d_array(const dynamic_2d_array& src) : m_row(src.m_row),
                                                    m_col(src.m_col),
                                                    m_data((src.m_row != 0 && src.m_col != 0) ? new T[src.m_row * s
    {
        for(int r = 0; r < m_row; ++r)
            for(int c = 0; c < m_col; ++c)
                (*this)[r][c] = src[r][c];
    }

    ~dynamic_2d_array()
    {
        if(m_data)
            delete []m_data;
    }

    inline T* operator[](int i) { return (m_data + (m_col * i)); }

    inline T const*const operator[](int i) const {return (m_data + (m_col * i)); }
```

```
private:
    dynamic_2d_array& operator=(const dynamic_2d_array&);
    const int m_row;
    const int m_col;
    T* m_data;
```

A different approach using the STL 'vector' class is shown in the following [FAQ...](#)

FAQ contributed by: [\[Axter\]](#)

Last edited by Andreas Masur; July 23rd, 2005 at 12:36 PM.



May 20th, 2005, 07:04 AM

#2



**NMTop40**  
Elite Member  
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Join Date: Oct 2000  
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**Re: C++ General: How to declare and use two-dimensional arrays?**

**A:** Here is another alternative approach. This uses a non-standard notation but is simple to use. I will call the class matrix.

Code:

```
template <typename T>
class Matrix
{
private:
    size_t m_nRows;
    size_t m_nCols;
    std::vector< T > m_vect;

public:
    Matrix( size_t nRows=0, size_t nCols=0, const T& t= T() )
        : m_nRows( nRows ), m_nCols( nCols), m_vect( nRows * nCols, t )
    {
    }

    size_t rows() const { return m_nRows; }
    size_t cols() const { return m_nCols; }

    T& operator()( size_t row, size_t col )
    {
        assert( row < m_nRows && col < m_nCols );
        return m_vect[ row * m_nCols + col ];
    }

    const T& operator()( size_t row, size_t col ) const
    {
        assert( row < m_nRows && col < m_nCols );
        return m_vect[ row * m_nCols + col ];
    }

    T* getRow( size_t row )
    {
        assert( row <= m_nRows ); // we allow one past the end
                                   // this permits certain algorithms
    }
}
```

That will give you reasonable functionality. You can do more with it (add a non-const iterator, give iterator more than FwdIterator traits).

**Note:** For matrices of numerical types, it may be better to use valarray instead of vector. Then a row could be returned as slicearray. I have never actually implemented one this way though.

Last edited by Andreas Masur; July 23rd, 2005 at 12:54 PM.



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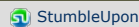
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