

Downcasting

DOWNCASTING 1

```
#include <iostream.h>

class Shape {
};

class Circle : public Shape {};

class Square : public Shape {};

class Other {};
```

Downcasting

```
int main() {
    Circle c;
    // Upcast: normal and OK
    Shape* s = &c;

    Circle* cp = NULL;
    Square* sp = NULL;
    Other* op = NULL;

    //Downcast
    cp = (Circle*)(s);
    sp = (Square*)(s);
    op = (Other*)(s);
    cout << "cp"<<cp<<endl;
    cout << "sp"<<sp<<endl;
    cout << "op"<<op<<endl<<endl;
```

DOWNCASTING 2

```
if(cp != NULL)
    cout << "It's a circle!" << endl;
if(sp != NULL)
    cout << "It's a square!" << endl;
if(op != NULL)
    cout << "It's other!" << endl;

int k; cin>>k;
```

Output:

```
cp0012FF84
sp0012FF84
op0012FF84
```

```
It's a circle!
It's a square!
It's other!
```

Static Downcasting

DOWNCASTING 3

```
int main() {
    Circle c;
    // Upcast: normal and OK
    Shape* s = &c;

    Circle* cp = NULL;
    Square* sp = NULL;
    Other* op = NULL;

    //Static Downcast
    cp = static_cast<Circle*>(s);
    sp = static_cast<Square*>(s);
    op = static_cast<Other*>(s);
    cout << "cp"<<cp<<endl;
    cout << "sp"<<sp<<endl;
    cout << "op"<<op<<endl<<endl;

    if(cp != NULL)
        cout << "It's a circle!" << endl;
    if(sp != NULL)
        cout << "It's a square!" << endl;
    if(op != NULL)
        cout << "It's other!" << endl;

    int k; cin>>k;
}
```

DOWNCASTING 4

Compiler error

```
[C++ Error] Downcasting.cpp(32): E2031
Cannot cast from 'Shape *' to 'Other *'.
```

Dynamic Downcasting

DOWNCASTING 5

```
int main() {
    Circle c;
    // Upcast: normal and OK
    Shape* s = &c;

    Circle* cp = NULL;
    Square* sp = NULL;
    Other* op = NULL;

    //Static Downcast
    cp = dynamic_cast<Circle*>(s);
    sp = dynamic_cast<Square*>(s);
    op = dynamic_cast<Other*>(s);
    cout << "cp"<<cp<<endl;
    cout << "sp"<<sp<<endl;
    cout << "op"<<op<<endl<<endl;

    if(cp != NULL)
        cout << "It's a circle!" << endl;
    if(sp != NULL)
        cout << "It's a square!" << endl;
    if(op != NULL)
        cout << "It's other!" << endl;

    int k; cin>>k;
}
```

DOWNCASTING 6

Compiler error

```
[C++ Error] Downcasting.cpp(29): E2307
Type 'Shape' is not a defined class with virtual functions.
```

Dynamic Downcasting

```
#include <iostream>
using namespace std;
class Shape {
public: virtual ~Shape() {};
};

class Circle : public Shape {};

class Square : public Shape {};

class Other {};
```

Downcasting: output

```
cp0012FF88
sp00000000
op00000000
```

It's a circle!