```
#include<iostream>
using namespace std;
#include<string>
#include<vector>

template<typename T>
class Pile : private vector<T>
{
public:
  virtual void empiler(T t);
  virtual void depiler();
  virtual T sommet();
  virtual void affiche(ostream & os);
  using vector<T>::size;
  using vector<T>::empty;
  // ou garder ces deux methodes plutot que empiler et depiler
  using vector<T>::push_back;
  using vector<T>::pop_back;
};

template<typename T>
void Pile<T>:: empiler(T t){this->push_back(t);}

template<typename T>
void Pile<T>::depiler(){this->pop_back();}

template<typename T>
T Pile<T>::sommet(){return *(this->begin());}

template<typename T>
void Pile<T>::affiche(ostream & os){for (int i=0; i<size(); i++) os <<
(*this)[i] << " ";}

int main()
{
Pile<int> p;
p.empiler(2);
p.empiler(4);
p.empiler(6);
p.empiler(8);
p.depiler();
p.affiche(cout);
cout << endl << p.size() << endl;
}
```

```
// fig 4.15

class B1
{
        private:
        virtual void y(){}
        public:
        virtual void mb1();
}

class B2
{
        private:
        virtual void x(){}
        friend class A;
        public:
        virtual void mb2();
};

class B : virtual public B1, virtual public B2
{
        public:
        virtual void mb();
};

class A
{
public:
virtual void ma();
};

class C
{
public:
virtual void mc();
};

void B1::mb1(){
B *b; b->x();
b->y();}
void B2::mb2(){
B *b; b->x();
b->y();}
void B::mb(){
B *b; b->x();
b->y();}
void A::mb(){
B *b; b->x();
b->y();}
void C::mb(){
B *b; b->x();
b->y();}

int main(){
}

/*
*/
```

```
// fig 4.15

class B1
{
        protected:
        virtual void y(){}
        public:
        virtual void mb1();
};

class B2
{
        protected:
        virtual void x(){}
        friend class A;
        public:
        virtual void mb2();
};

class B : virtual public B1, virtual public B2
{
        public:
        virtual void mb();
};

class A
{
public:
virtual void ma();
};

class C
{
public:
virtual void mc();
};

void B1::mb1(){
B *b; b->x();
b->y();}
void B2::mb2(){
B *b; b->x();
b->y();}
void B::mb(){
B *b; b->x();
b->y();}
void A::ma(){
B *b; b->x();
b->y();}
void C::mc(){
B *b; b->x();
b->y();}

int main(){
}

/*
fig412.cc: In member function 'virtual void B1::mb1()':
```

```
fig412.cc:14: error: 'virtual void B2::x()' is protected
fig412.cc:39: error: within this context
fig412.cc: In member function 'virtual void B2::mb2()':
fig412.cc:6: error: 'virtual void B1::y()' is protected
fig412.cc:43: error: within this context
fig412.cc: In member function 'virtual void A::ma()':
fig412.cc:6: error: 'virtual void B1::y()' is protected
fig412.cc:49: error: within this context
fig412.cc: In member function 'virtual void C::mc()':
fig412.cc:14: error: 'virtual void B2::x()' is protected
fig412.cc:51: error: within this context
fig412.cc:6: error: 'virtual void B1::y()' is protected
fig412.cc:52: error: within this context
*/
```

```
// fig 4.15
class A; class B;

class C1
{
        protected: virtual void f(){}
        friend class A;
        friend class B;
        public:
        virtual void mc1();
};

class C2 : public virtual C1
{
public:
virtual void mc2();
};

void C1::mc1(){
C1 *c1; c1->f();
C2 *c2; c2->f();}

void C2::mc2(){
C1 *c1; c1->f();
C2 *c2; c2->f();}

class A
{
public:
virtual void ma(){
C1 *c1; c1->f();
C2 *c2; c2->f();}
};

class B : public virtual A
{
public:
virtual void mb(){
C1 *c1; c1->f();
C2 *c2; c2->f();}
};

class D
{
public:
virtual void md(){
C1 *c1; c1->f();
C2 *c2; c2->f();}
};

int main(){
C1 *c1; c1->f();
C2 *c2; c2->f();}

/* si f protected
fig415.cc: In member function 'virtual void C2::mc2()':
fig415.cc:6: error: 'virtual void C1::f()' is protected
fig415.cc:24: error: within this context
```

```
fig415.cc: In member function 'virtual void D::md()':
fig415.cc:6: error: 'virtual void C1::f()' is protected
fig415.cc:47: error: within this context
fig415.cc:6: error: 'virtual void C1::f()' is protected
fig415.cc:48: error: within this context
fig415.cc: In function 'int main()':
fig415.cc:6: error: 'virtual void C1::f()' is protected
fig415.cc:52: error: within this context
fig415.cc:6: error: 'virtual void C1::f()' is protected
fig415.cc:53: error: within this context
*/

/* si f private
fig415.cc: In member function 'virtual void C2::mc2()':
fig415.cc:6: error: 'virtual void C1::f()' is private
fig415.cc:24: error: within this context
fig415.cc:6: error: 'virtual void C1::f()' is private
fig415.cc:25: error: within this context
fig415.cc: In member function 'virtual void D::md()':
fig415.cc:6: error: 'virtual void C1::f()' is private
fig415.cc:47: error: within this context
fig415.cc:6: error: 'virtual void C1::f()' is private
fig415.cc:48: error: within this context
fig415.cc: In function 'int main()':
fig415.cc:6: error: 'virtual void C1::f()' is private
fig415.cc:52: error: within this context
fig415.cc:6: error: 'virtual void C1::f()' is private
fig415.cc:53: error: within this context
*/
```

```
// fig 4.15
class A; class B;

class C1
{
        protected: virtual void f(){}
        friend class A;
        friend class B;
        public:
        virtual void mc1();
};

class C2 : public virtual C1
{
        protected: virtual void f(){}
        public:
        virtual void mc2();
        friend class D;
};

void C1::mc1(){
C1 *c1; c1->f();
C2 *c2; c2->f();}

void C2::mc2(){
C1 *c1; c1->f();
C2 *c2; c2->f();}

class A
{
public:
virtual void ma(){
C1 *c1; c1->f();
C2 *c2; c2->f();}
};

class B : public virtual A
{
public:
virtual void mb(){
C1 *c1; c1->f();
C2 *c2; c2->f();}
};

class D
{
public:
virtual void md(){
C1 *c1; c1->f();
C2 *c2; c2->f();}
};

int main(){
C1 *c1; c1->f();
C2 *c2; c2->f();}

/* si f protected
fig416.cc: In member function 'virtual void C1::mc1()':
```

```
fig416.cc:15: error: 'virtual void C2::f()' is protected
fig416.cc:23: error: within this context
fig416.cc: In member function 'virtual void C2::mc2()':
fig416.cc:6: error: 'virtual void C1::f()' is protected
fig416.cc:26: error: within this context
fig416.cc: In member function 'virtual void A::ma()':
fig416.cc:15: error: 'virtual void C2::f()' is protected
fig416.cc:34: error: within this context
fig416.cc: In member function 'virtual void B::mb()':
fig416.cc:15: error: 'virtual void C2::f()' is protected
fig416.cc:42: error: within this context
fig416.cc: In member function 'virtual void D::md()':
fig416.cc:6: error: 'virtual void C1::f()' is protected
fig416.cc:49: error: within this context
fig416.cc: In function 'int main()':
fig416.cc:6: error: 'virtual void C1::f()' is protected
fig416.cc:54: error: within this context
fig416.cc:15: error: 'virtual void C2::f()' is protected
fig416.cc:55: error: within this context
*/
```