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CSE 335 Homework 2

1. Show for public inheritance, for the public data and functions in the base class, they can be accessed by the derived class, and also they can be accessed like public data and functions of the derived class by both the clients of the derived class and further derived classes.
    a. Line 45: Derived class can access public data
    b. Line 53: Derived class can access public function
    c. Line 68: Derived derived class can access public data
    d. Line 76: Derived derived class can access public function
    e. Line 172: Client can access public data
    f. Line 176: Client can access public function

2. Show for public inheritance, for protected data and functions in the base class, they can be accessed by the derived class, and they can also be accessed like protected data and functions of the derived class by further derived classes.
    a. Line 46: Derived class can access protected data
    b. Line 54: Derived class can access protected function
    c. Line 69: Derived derived class can access protected data
    d. Line 77: Derived derived class can access protected function
    e. Line 173: Client cannot access protected data

```
main.cpp:87:20: error: 'age' is a protected member of 'animal'
    cout << newcat.age << endl; //error: 'age' is a protected member of 'animal'
                   ^
main.cpp:25:11: note: declared protected here
    short age;
          ^
```

    f. Line 177: Client cannot access protected function

```
main.cpp:91:12: error: 'changeAge' is a protected member of 'animal'
    newcat.changeAge(10); //error: 'changeAge' is a protected member of 'animal'
           ^
main.cpp:26:10: note: declared protected here
    void changeAge(short newage){
         ^
```

3. Show for public inheritance, for private data and functions in the base class, they cannot be accessed by the derived class.
    a. Line 48: Derived class cannot access private data

```
main.cpp:41:17: error: 'ID' is a private member of 'animal'
        cout << ID << endl;
                ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    b. Line 56: Derived class cannot access private function

```
main.cpp:49:9: error: 'changeID' is a private member of 'animal'
        changeID(newID);
        ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
```

    c. Line 71: Derived derived class cannot access private data

```
main.cpp:71:17: error: 'ID' is a private member of 'animal'
        cout << ID << endl;
                ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    d. Line 79: Derived derived class cannot access private function

```
main.cpp:79:9: error: 'changeID' is a private member of 'animal'
        changeID(newID);
        ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
```

    e. Line 174: Client cannot access private data

```
main.cpp:88:20: error: 'ID' is a private member of 'animal'
    cout << newcat.ID << endl;  //error: 'ID' is a private member of 'animal'
                   ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    f. Line 178: Client cannot access private function

```
main.cpp:92:12: error: 'changeID' is a private member of 'animal'
    newcat.changeID(10);  //error: 'changeID' is a private member of 'animal'
           ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
```

4. Show for protected inheritance, for public and protected data and functions in the base class, they can be accessed by the derived class, and also they can be accessed like protected data and functions of the derived class by further derived classes.
    a. Line 90-91: Derived class can access public/protected data
    b. Line 98-99: Derived class can access public/protected function
    c. Line 113-114: Derived derived class can access public/protected data
    d. Line 121-122: Derived derived class can access public/protected function
    e. Line 181-182: Client cannot access public/protected data

```
main.cpp:140:13: error: cannot cast 'dog' to its protected base class 'animal'
    cout << newdog.name << endl;
            ^
main.cpp:84:12: note: declared protected here
class dog: protected animal{
           ^~~~~~~~~~~~~~~~
main.cpp:140:20: error: 'name' is a protected member of 'animal'
    cout << newdog.name << endl;
                   ^
main.cpp:84:12: note: constrained by protected inheritance here
class dog: protected animal{
           ^~~~~~~~~~~~~~~~
main.cpp:20:12: note: member is declared here
    string name;
           ^

main.cpp:141:13: error: cannot cast 'dog' to its protected base class 'animal'
    cout << newdog.age << endl; //error: 'age' is a protected member of 'animal'
            ^
main.cpp:84:12: note: declared protected here
class dog: protected animal{
           ^~~~~~~~~~~~~~~~
main.cpp:141:20: error: 'age' is a protected member of 'animal'
    cout << newdog.age << endl; //error: 'age' is a protected member of 'animal'
                   ^
main.cpp:25:11: note: declared protected here
    short age;
          ^
```

    f. Line 185-186: Client cannot access public/protected function

```
main.cpp:144:12: error: 'changeName' is a protected member of 'animal'
    newdog.changeName("Doggo");
           ^
main.cpp:84:12: note: constrained by protected inheritance here
class dog: protected animal{
           ^~~~~~~~~~~~~~~~
main.cpp:21:10: note: member is declared here
    void changeName(string newname){
         ^
main.cpp:144:5: error: cannot cast 'dog' to its protected base class 'animal'
    newdog.changeName("Doggo");
    ^
main.cpp:84:12: note: declared protected here
class dog: protected animal{
           ^~~~~~~~~~~~~~~~

main.cpp:145:12: error: 'changeAge' is a protected member of 'animal'
    newdog.changeAge(10); //error: 'changeAge' is a protected member of 'animal'
           ^
main.cpp:26:10: note: declared protected here
    void changeAge(short newage){
         ^
main.cpp:145:5: error: cannot cast 'dog' to its protected base class 'animal'
    newdog.changeAge(10); //error: 'changeAge' is a protected member of 'animal'
    ^
main.cpp:84:12: note: declared protected here
class dog: protected animal{
           ^~~~~~~~~~~~~~~~
```

5. Show for protected inheritance, for private data and functions in the base class, they cannot be accessed by the derived class.
    a. Line 93: Derived class cannot access private data

```
main.cpp:93:17: error: 'ID' is a private member of 'animal'
        cout << ID << endl;
                ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    b. Line 101: Derived class cannot access private function

```
main.cpp:101:9: error: 'changeID' is a private member of 'animal'
        changeID(newID);
        ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
```

    c. Line 116: Derived derived class cannot private public data

```
main.cpp:116:17: error: 'ID' is a private member of 'animal'
        cout << ID << endl;
                ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    d. Line 124: Derived derived class cannot private public function

```
main.cpp:124:9: error: 'changeID' is a private member of 'animal'
        changeID(newID);
        ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
```

    e. Line 183: Client cannot access private data

```
main.cpp:142:13: error: cannot cast 'dog' to its protected base class 'animal'
    cout << newdog.ID << endl;  //error: 'ID' is a private member of 'animal'
            ^
main.cpp:84:12: note: declared protected here
class dog: protected animal{
           ^~~~~~~~~~~~~~~~
main.cpp:142:20: error: 'ID' is a private member of 'animal'
    cout << newdog.ID << endl;  //error: 'ID' is a private member of 'animal'
                    ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    f. Line 187: Client cannot access private function

```
main.cpp:146:12: error: 'changeID' is a private member of 'animal'
    newdog.changeID(10);  //error: 'changeID' is a private member of 'animal'
           ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
main.cpp:146:5: error: cannot cast 'dog' to its protected base class 'animal'
    newdog.changeID(10);  //error: 'changeID' is a private member of 'animal'
    ^
main.cpp:84:12: note: declared protected here
class dog: protected animal{
           ^~~~~~~~~~~~~~~~
```

6. Show for private inheritance, for public and protected data and functions in the base class, they can be accessed by the derived class, but they cannot be accessed by the clients of the derived class, and they cannot be accessed by further derived classes.
    a. Line 135-136: Derived class can access public/protected data
    b. Line 143-144: Derived class can access public/protected function
    c. Line 158-159: Derived derived class cannot access public/protected data

```
main.cpp:158:17: error: cannot cast 'finch' to its private base class 'animal'
        cout << name << endl; //error: 'name' is a private member of 'animal'
                ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:158:17: error: 'name' is a private member of 'animal'
        cout << name << endl; //error: 'name' is a private member of 'animal'
                ^
main.cpp:129:13: note: constrained by private inheritance here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:20:12: note: member is declared here
    string name;
           ^
```

```
main.cpp:159:17: error: cannot cast 'finch' to its private base class 'animal'
        cout << age << endl;  //error: 'age' is a private member of 'animal'
                ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:159:17: error: 'age' is a private member of 'animal'
        cout << age << endl;  //error: 'age' is a private member of 'animal'
                ^
main.cpp:129:13: note: constrained by private inheritance here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:25:11: note: member is declared here
    short age;
          ^
```

    d. Line 164-165: Derived derived class cannot access public/protected function

```
main.cpp:164:9: error: 'changeName' is a private member of 'animal'
        changeName(newname);  //error: 'changeName' is a private member of 'animal'
        ^
main.cpp:129:13: note: constrained by private inheritance here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:21:10: note: member is declared here
    void changeName(string newname){
         ^
main.cpp:164:9: error: cannot cast 'finch' to its private base class 'animal'
        changeName(newname);  //error: 'changeName' is a private member of 'animal'
        ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
```

```
main.cpp:165:9: error: 'changeAge' is a private member of 'animal'
        changeAge(newage);    //error: 'changeAge' is a private member of 'animal'
        ^
main.cpp:129:13: note: constrained by private inheritance here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:26:10: note: member is declared here
    void changeAge(short newage){
         ^
main.cpp:165:9: error: cannot cast 'finch' to its private base class 'animal'
        changeAge(newage);    //error: 'changeAge' is a private member of 'animal'
        ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
```

    e. Line 190-191: Client cannot access public/protected data

```
main.cpp:191:13: error: cannot cast 'bird' to its private base class 'animal'
    cout << newbird.age << endl;  //error: 'age' is a protected member of 'animal'
            ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:191:21: error: 'age' is a private member of 'animal'
    cout << newbird.age << endl;  //error: 'age' is a protected member of 'animal'
                    ^
main.cpp:129:13: note: constrained by private inheritance here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:25:11: note: member is declared here
    short age;
          ^
```

```
in.cpp:190:13: error: cannot cast 'bird' to its private base class 'animal'
  cout << newbird.name << endl; //error: 'name' is a protected member of 'animal'
          ^
in.cpp:129:13: note: declared private here
ass bird: private animal{
          ^~~~~~~~~~~~~~
in.cpp:190:21: error: 'name' is a private member of 'animal'
  cout << newbird.name << endl; //error: 'name' is a protected member of 'animal'
                  ^
in.cpp:129:13: note: constrained by private inheritance here
ass bird: private animal{
          ^~~~~~~~~~~~~~
in.cpp:20:12: note: member is declared here
  string name;
         ^
```

    f. Line 194-195: Client cannot access public/protected function

```
main.cpp:194:13: error: 'changeName' is a private member of 'animal'
    newbird.changeName("Voco");  //error: 'changeName' is a protected member of 'animal'
            ^
main.cpp:129:13: note: constrained by private inheritance here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:21:10: note: member is declared here
    void changeName(string newname){
         ^
main.cpp:194:5: error: cannot cast 'bird' to its private base class 'animal'
    newbird.changeName("Voco");  //error: 'changeName' is a protected member of 'animal'
    ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
```

```
main.cpp:195:13: error: 'changeAge' is a private member of 'animal'
    newbird.changeAge(10);       //error: 'changeAge' is a protected member of 'animal'
            ^
main.cpp:129:13: note: constrained by private inheritance here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:26:10: note: member is declared here
    void changeAge(short newage){
         ^
main.cpp:195:5: error: cannot cast 'bird' to its private base class 'animal'
    newbird.changeAge(10);       //error: 'changeAge' is a protected member of 'animal'
    ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
```

7. Show for private inheritance, for private data and functions in the base class, they cannot be accessed by the derived class.
    a. Line 138: Derived class cannot access private data

```
main.cpp:138:17: error: 'ID' is a private member of 'animal'
        cout << ID << endl;
                ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    b. Line 146: Derived class cannot access private function

```
main.cpp:146:9: error: 'changeID' is a private member of 'animal'
        changeID(newID);
        ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
```

    c. Line 160: Derived derived class cannot access private data

```
main.cpp:160:17: error: cannot cast 'finch' to its private base class 'animal'
        cout << ID << endl;   //error: 'ID' is a private member of 'animal'
                ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:160:17: error: 'ID' is a private member of 'animal'
        cout << ID << endl;   //error: 'ID' is a private member of 'animal'
                ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    d. Line 166: Derived derived class cannot access private function

```
main.cpp:166:9: error: 'changeID' is a private member of 'animal'
        changeID(newID);      //error: 'changeID' is a private member of 'animal'
        ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
main.cpp:166:9: error: cannot cast 'finch' to its private base class 'animal'
        changeID(newID);      //error: 'changeID' is a private member of 'animal'
        ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
```

    e. Line 192: Client cannot access private data

```
main.cpp:192:13: error: cannot cast 'bird' to its private base class 'animal'
    cout << newbird.ID << endl;   //error: 'ID' is a private member of 'animal'
            ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
main.cpp:192:21: error: 'ID' is a private member of 'animal'
    cout << newbird.ID << endl;   //error: 'ID' is a private member of 'animal'
                    ^
main.cpp:30:11: note: declared private here
    short ID;
          ^
```

    f. Line 196: Client cannot access private function

```
main.cpp:196:13: error: 'changeID' is a private member of 'animal'
    newbird.changeID(10);        //error: 'changeID' is a private member of 'animal'
            ^
main.cpp:31:10: note: declared private here
    void changeID(short newID){
         ^
main.cpp:196:5: error: cannot cast 'bird' to its private base class 'animal'
    newbird.changeID(10);        //error: 'changeID' is a private member of 'animal'
    ^
main.cpp:129:13: note: declared private here
class bird: private animal{
            ^~~~~~~~~~~~~~
```