NOOR-UL-AIN SAGHEER(BCS223020)

**CODE:**

#include<iostream>

using namespace std;

class sector

{

private:

int sect\_id;

string sect\_name;

public:

sector(int id, string name)

{

sect\_id = id;

sect\_name = name;

}

void display() const

{

cout << " Sector id: " << sect\_id << endl;

cout << " Sector name: " << sect\_name << endl;

}

};

class laboratory

{

public:

int lab\_id;

string access\_level;

int exp\_no;

laboratory() {}

laboratory(int id, string level, int exp)

{

lab\_id = id;

access\_level = level;

exp\_no = exp;

}

void display\_lab() const

{

cout << " Laboratory details: " << endl;

cout << " lab id: " << lab\_id << endl;

cout << " Access level: " << access\_level << endl;

cout << " experiment number: " << exp\_no << endl;

}

};

class department

{

public:

string dep\_name;

string location;

sector\* sect;

department(const string& name, const string& loc, sector\* s)

{

dep\_name = name;

location = loc;

sect = s;

}

void display() const

{

cout << " Department information: " << dep\_name << endl;

cout << " location: " << location << endl;

if (sect != nullptr)

{

sect->display();

}

}

};

class person

{

protected:

string name;

int age;

public:

person() {}

person(const string& n, int a)

{

name = n;

age = a;

}

void display() const

{

cout << " Name of a person: " << name << endl;

cout << " Age of a person: " << age << endl;

}

};

class scientist : public person

{

public:

string sci\_name;

department\* dept;

string designation;

scientist(const string& n, int a, const string& s, department\* d, string desig)

: person(n, a), sci\_name(s), dept(d), designation(desig)

{}

void display\_det() const

{

person::display();

cout << " scientist name: " << sci\_name << endl;

cout << " designation: " << designation << endl;

if (dept != nullptr)

{

dept->display();

}

}

};

class engineer : public person

{

public:

laboratory lab; // engineer owns a laboratory (composition)

engineer(const string& n, int a, const laboratory& l)

: person(n, a), lab(l)

{}

void display() const

{

person::display();

cout << "Engineer's Laboratory ID: " << lab.lab\_id << endl;

cout << "Access Level : " << lab.access\_level << endl;

}

};

int main()

{

// Create a Sector

sector\* sect = new sector(1, "Research");

// Create a Department

department\* dep = new department("Science", "Building A", sect);

// Create a Scientist

scientist sci("john", 35, "Dr. Doe", dep, "Research Scientist");

// Create an Engineer

laboratory lab(101, "dont know", 5); // Laboratory for an Engineer

engineer eng("Alice Smith", 28, lab);

// Display details

sci.display\_det();

cout << endl;

eng.display();

// Cleanup (delete dynamically allocated objects)

delete dep;

delete sect;

return 0;

}

**OUTPUT:**

****