Airlines

Description of the project

The project implements the structure of airline companies. The leading class company holds all their flights in a list and has sets of references to owned planes, employed crew members (stewardesses and pilots). Plane, flight, and crew member store company pointers to forbid assigning them to multiple airline companies.

Passengers, crew members, and planes are stored in a list outside any class; on the other hand, flights are stored inside the company they belong to in the list. They are created and destroyed using the functions from the company class (flight constructors are private).

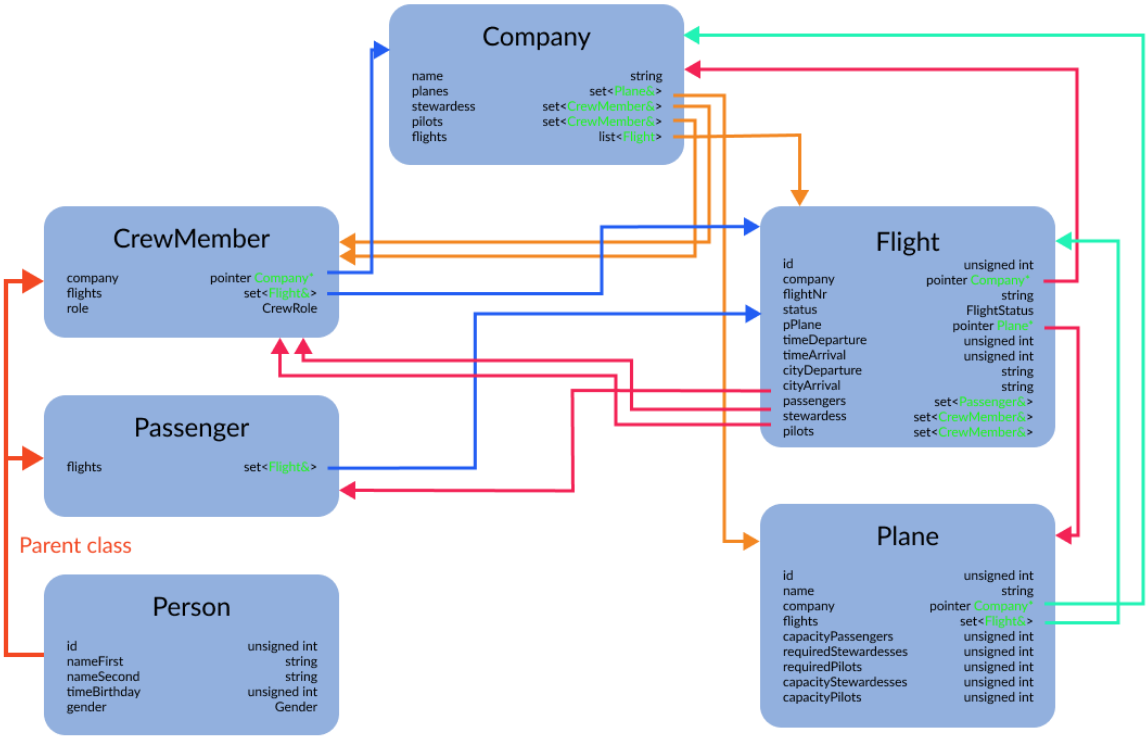
Each flight consists of the ID, flight status, sets of reference to plane, passenger, stewardess, pilots. Pointer to company to which belongs, and characteristic data for the flight: city of departure, arrival, and UTC of departure and arrival in milliseconds.

The class plane has set of reference to all its flights, ID, name, company that belongs to, and parameters describing the plane, such as passengers, stewardesses, pilots capacity, and required number of stewardesses and pilots to operate the flight.

The next class is a person with ID, first and second name, birthday time (UTC in milliseconds), and gender. Class person is parent class for passenger and crew member classes.

The passenger and crew member class contains set of reference to flights. The crew member class is more extended as it store the role of the crew member: pilot or stewardess. Separating these classes will allow the implementation of specific functions and parameters for these classes in the future.

Case study



Declaration of the classes

```
class Company {
   public:
    Company(std::string name);

    ~Company();

    std::string getName() const;
    std::list<Flight>& getFlights();
    std::set<std::reference_wrapper<Plane>>& getPlanes();
    std::set<std::reference_wrapper<CrewMember>>& getStewardesses();
    std::set<std::reference_wrapper<CrewMember>>& getPilots();

    void setName(const std::string name);
    // ADD PLANE TO COMPANY AND SET PLANE'S COMPANY
```

```
    void addPlane(Plane& plane);
    // REMOVE PLANE FROM COMPANY AND REMOVES PLANE'S COMPANY
    bool removePlane(Plane& plane);
    bool removePlanes();

    // ADD CREW MEMBER TO COMPANY AND SET CREW MEMBER'S COMPANY
    void addCrewMember(CrewMember& crewMember);
    // REMOVE CREW MEMBER FROM COMPANY AND REMOVES CREW MEMBER'S COMPANY
    bool removeCrewMember(CrewMember& crewMember);
    bool removeCrewMembers();

    // CRETE FLIGHT IN COMPANY
    Flight& createFlight(std::string flightNr,
                         Plane& plane,
                         unsigned long long timeDeparture,
                         unsigned long long timeArrival,
                         std::string cityDeparture,
                         std::string cityArrival);

    Flight& createFlight(std::string flightNr,
                         unsigned long long timeDeparture,
                         unsigned long long timeArrival,
                         std::string cityDeparture,
                         std::string cityArrival);
    // REMOVE FLIGHT, DELETE FROM ALL CLASSES
    bool removeFlight(Flight& flight);
    bool removeFlights();

    std::set<std::reference_wrapper<CrewMember>>
availableCrewMembers(unsigned long long timeStart, unsigned long long
timeEnd, CrewRole role);

    friend std::ostream& operator<<(std::ostream& os, Company& company);
```

```
   private:
    std::string name;
    std::list<Flight> flights;
    std::set<std::reference_wrapper<Plane>> planes;
    std::set<std::reference_wrapper<CrewMember>> stewardesses;
    std::set<std::reference_wrapper<CrewMember>> pilots;
};
```

```
class Person {
   public:
    static std::vector<unsigned int> usedIds;

    Person(
        std::string nameFirst,
        std::string nameSecond,
        unsigned int timeBirthday,
        Gender gender);

    ~Person();

    unsigned int getId() const;
    std::string getNameFirst() const;
    std::string getNameSecond() const;
    unsigned int getTimeBirthday() const;
    Gender getGender() const;

    void setNameFirst(const std::string name);
    void setNameSecond(const std::string name);

    void setTimeBirthday(const unsigned int time);

   private:
    void setId();
```

```
    unsigned int id;
    std::string nameFirst;
    std::string nameSecond;

    unsigned int timeBirthday;  // time in miliseconds UTC
    Gender gender;
};
```

```
class CrewMember : public Person {
   public:
    CrewMember(
        Company* pCompany,
        CrewRole role,
        std::string nameFirst,
        std::string nameSecond,
        unsigned int timeBirthday,
        Gender gender);

    CrewMember(
        CrewRole role,
        std::string nameFirst,
        std::string nameSecond,
        unsigned int timeBirthday,
        Gender gender);

    ~CrewMember();

    CrewRole getRole() const;
    Company* getCompany() const;
    std::set<std::reference_wrapper<Flight>>& getFlights();

    // INVOKE FUNCTION FROM COMPANY TO ADD CREW MEMBER
    bool setCompany(Company* pCompany);
```

```
    // INVOKE FUNCTION FROM FLIGHT TO ADD CREW MEMBER
    void addFlight(Flight& flight);
    // INVOKE FUNCTION FROM FLIGHT TO REMOVE CREW MEMBER
    bool removeFlight(Flight& flight);

    // INVOKE FOR ALL FLIGHTS FUNCTION removeFlight
    bool removeFlights();

    friend bool operator==(const std::reference_wrapper<CrewMember>& one,
const CrewMember& other);
    friend bool operator<(const std::reference_wrapper<CrewMember>& one,
const std::reference_wrapper<CrewMember>& other);
    friend std::ostream& operator<<(std::ostream& os, CrewMember&
crewMember);

   private:
    Company* pCompany;
    std::set<std::reference_wrapper<Flight>> flights;

    CrewRole role;
};
```

```
class Passenger : public Person {
   public:
    Passenger(
        std::string nameFirst,
        std::string nameSecond,
        unsigned int timeBirthday,
        Gender gender);

    ~Passenger();

    std::set<std::reference_wrapper<Flight>>& getFlights();
```

```
    // INVOKE FUNCTION FROM FLIGHT TO ADD PASSENGER
    void addFlight(Flight& flight);
    // INVOKE FUNCTION FROM FLIGHT TO REMOVE PASSENGER
    bool removeFlight(Flight& flight);

    // INVOKE FOR ALL FLIGHTS FUNCTION removeFlight
    bool removeFlights();

    friend bool operator==(const std::reference_wrapper<Passenger>& one,
const Passenger& other);
    friend bool operator<(const std::reference_wrapper<Passenger>& one, const
std::reference_wrapper<Passenger>& other);
    friend std::ostream& operator<<(std::ostream& os, Passenger& passenger);

   private:
    std::set<std::reference_wrapper<Flight>> flights;
};
```

```
class Plane {
   public:
    static std::vector<unsigned int> usedIds;

    Plane(
        Company* pCompany,
        std::string name,
        unsigned int capacityPassengers,
        unsigned int requiredStewardesses,
        unsigned int requiredPilots);

    Plane(
        std::string name,
        unsigned int capacityPassengers,
        unsigned int requiredStewardesses,
        unsigned int requiredPilots);
```

```
    ~Plane();

    unsigned int getId() const;
    std::string getName() const;
    Company* getCompany() const;
    unsigned int getCapacityPassengers() const;
    unsigned int getRequiredStewardesses() const;
    unsigned int getCapacityStewardesses() const;
    unsigned int getRequiredPilots() const;
    unsigned int getCapacityPilots() const;
    std::set<std::reference_wrapper<Flight>>& getFlights();

    bool setCompany(Company* pCompany);
    void setName(const std::string name);

    void setCapacityPassengers(const unsigned int number);
    void setRequiredStewardesses(const unsigned int number);
    void setRequiredPilots(const unsigned int number);

    bool inRangePassengers(const unsigned int number) const;

    bool inRangeStewardesses(const unsigned int number) const;
    bool maximumStewardesses(const unsigned int number) const;

    bool inRangePilots(const unsigned int number) const;
    bool maximumPilots(const unsigned int number) const;

    bool inRangeCrew(const unsigned int stewardess, const unsigned int
pilots) const;

    // INVOKE FUNCTION FROM FLIGHT TO ADD PLANE
    void addFlight(Flight& flight);
    // INVOKE FUNCTION FROM FLIGHT TO REMOVE PLANE
```

```
    bool removeFlight(Flight& flight);
    // INVOKE FOR ALL FLIGHTS FUNCTION removeFlight
    bool removeFlights();

    friend bool operator==(const std::reference_wrapper<Plane>& one, const
Plane& other);
    friend bool operator<(const std::reference_wrapper<Plane>& one, const
std::reference_wrapper<Plane>& other);
    friend std::ostream& operator<<(std::ostream& os, Plane& plane);

   private:
    void setId();

    unsigned int id;
    std::string name;

    Company* pCompany;
    std::set<std::reference_wrapper<Flight>> flights;

    unsigned int capacityPassengers;
    unsigned int requiredStewardesses;
    unsigned int requiredPilots;

    unsigned int capacityStewardesses;
    unsigned int capacityPilots;
};
```

```
class Flight {
   public:
    ~Flight();

    static std::vector<unsigned int> usedIds;

    Company* getCompany() const;
```

```
    unsigned int getId() const;
    std::string getFlightNr() const;
    FlightStatus getStatus() const;
    Plane* getPlane() const;
    unsigned long long getTimeDeparture() const;
    unsigned long long getTimeArrival() const;
    std::string getCityDeparture() const;
    std::string getCityArrival() const;

    std::set<std::reference_wrapper<Passenger>>& getPassengers();
    std::set<std::reference_wrapper<CrewMember>>& getStewardesses();
    std::set<std::reference_wrapper<CrewMember>>& getPilots();

    void setStatus();
    void setFlightNr(const std::string flightNr);
    // CHANGE PLANE FOR ANOTHER AND CHECK IF PASSENGERS, STEWARDESS, PILOTS
ARE WITHIN RANGE
    void setPlane(Plane& plane);
    bool removePlane();

    // CHANGE DATA TIME CALLED IN CONSTRUCTOR VALIDATING ARGUMENTS WITH THIS
DATA PARAMETERS
    void changeDataDeparture(const unsigned long long time);
    void changeDataArrival(const unsigned long long time);
    void changeDataDeparture(const unsigned long long time, const std::string
city);
    void changeDataArrival(const unsigned long long time, const std::string
city);

    // ADD PASSENGER TO FLIGHT,ADD FLIGHT TO PASSENGER
    void addPassenger(Passenger& passenger);
    // REMOVE PASSENGER FROM FLIGHT, REMOVE FLIGHT FROM PASSENGER
    bool removePassenger(Passenger& passenger);
    bool removePassengers();
```

```
    // ADD CREW MEMBER TO FLIGHT, ADD FLIGHT TO CREW MEMBER
    void addCrewMember(CrewMember& crewMember);
    // REMOVE CREW MEMBER FROM FLIGHT, REMOVE FLIGHT FROM CREW MEMBER
    bool removeCrewMember(CrewMember& crewMember);
    bool removeCrewMembers();

    // CHECK FOR FLIGHT TIME OVERLAP WITH TIME PERIOD
    bool timeOverlap(const Flight& flight) const;
    bool timeOverlap(const unsigned long long timeStart, const unsigned long
long timeEnd) const;

    bool operator==(const Flight& other) const;

    friend bool operator==(const std::reference_wrapper<Flight>& one, const
Flight& other);
    friend bool operator<(const std::reference_wrapper<Flight>& one, const
std::reference_wrapper<Flight>& other);
    friend std::ostream& operator<<(std::ostream& os, Flight& flight);

   private:
    Flight(
        Company* pCompany,
        std::string flightNr,
        unsigned long long timeDeparture,
        unsigned long long timeArrival,
        std::string cityDeparture,
        std::string cityArrival);

    void setId();

    // SET PLANE CALLED IN CONSTRUCTOR WITHOUT ANY CHECK ON CAPACITY LIMITS
    void setupPlane(Plane& plane);
    // SET DATA TIME CALLED IN CONSTRUCTOR VALIDATING ARGUMENTS
```

```
    void setDataTime(const unsigned long long timeDeparture, const unsigned
long long timeArrival);
    void setDataTime(const unsigned long long timeDeparture, const
std::string cityDeparture, const unsigned long long timeArrival, const
std::string cityArrival);

    unsigned int id;
    Company* pCompany;
    std::string flightNr;
    FlightStatus status;
    Plane* pPlane;

    unsigned long long timeDeparture;  // time in miliseconds
    unsigned long long timeArrival;    // time in miliseconds
    std::string cityDeparture;
    std::string cityArrival;

    std::set<std::reference_wrapper<Passenger>> passengers;
    std::set<std::reference_wrapper<CrewMember>> stewardesses;
    std::set<std::reference_wrapper<CrewMember>> pilots;

    friend Company;
};
```

Tests

```
[----------] Global test environment tear-down
[==========] 33 tests from 7 test suites ran. (865 ms total)
[  PASSED  ] 33 tests.
==517375==
==517375== HEAP SUMMARY:
==517375==     in use at exit: 0 bytes in 0 blocks
==517375==   total heap usage: 1,066 allocs, 1,066 frees, 195,212 bytes allocated
==517375==
==517375== All heap blocks were freed -- no leaks are possible
==517375==
==517375== For lists of detected and suppressed errors, rerun with: -s
==517375== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
lab09011%
```