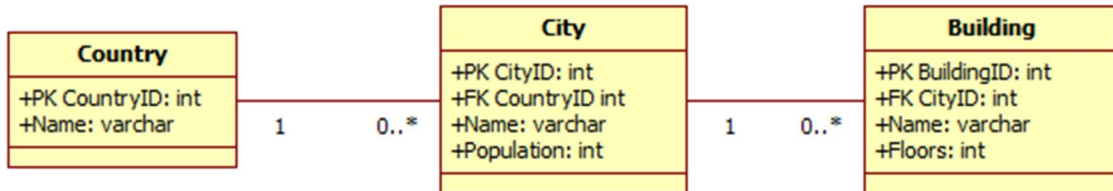


RECRUITMENT TEST (C++ SOFTWARE ENGINEER)

Instruction: Please answer the following questions to the best of your ability and return your solutions to X-Formation for review.

1. Consider the following physical data model



Write a SQL query that:

- I. Selects names of all buildings in Poland.
- II. Selects countries where a total number of inhabitants (population) in all the cities is greater than 400.
- III. (*) Selects names of countries that have no buildings at all.

(*) Extra task not required.

2. There are at least 4 different bugs in the implementation of the following Array class. For at least 2 of them could you please:

- I. Provide a test case for each bug.
- II. Propose a fix for each bug.
- III. (*) Assuming we have a bug-free implementation of Array class, do you think there are any design problems with it?

(*) Extra task not required.

```

template <class T>
class Array
{
private:
    T *m_pData;
    unsigned int m_nSize;

public:
    Array(unsigned int nSize) : m_nSize(nSize)
    {
        if(m_nSize > 0)
            m_pData = new (nothrow) T[m_nSize];
    }

    virtual ~Array()
    {
        if(m_pData != NULL)
            delete m_pData;
    }

    bool Set(unsigned int nPos, const T& Value)
    {
        if(nPos < m_nSize)
        {
            m_pData[nPos] = Value;
            return true;
        }
        else
            return false;
    }

    T Get(unsigned int nPos)
    {
        if(nPos < m_nSize)
            return m_pData[nPos];
        else
            return T();
    }
};
    
```