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CS 590 Homework 5: Creativity  
Exercises

Due Date: February 27, 2022

### **Problem 6.7.15:**

To achieve our requirements in the given time constraints, we can use an unordered map of (int - vector<int>).

**Put(k,v):** While we try to insert a value against a particular key value, we look into the unordered map, find the corresponding vector of the key, and push back the value. The search of map occurs in  $O(1)$  and push\_back of vector occurs in  $O(1)$ . So, the total time is  $O(1)$ .

**Findall(k) :** Find the vector of the key in the unordered map (  $O(1)$  time ), and traverse the whole vector. Let's say there are  $s$  values

against a particular key. So traversing the vector will be of  $O(s)$ . So, the total time is  $O(1+s)$ .

```
unordered_map<int,vector<int>> mp;
```

```
//declaration of the Data Structure
```

```
void put(int key,int value)
```

```
{
```

```
    mp[key].push_back(value); //O(1)
```

```
}
```

```
void Findall(int key)
```

```
{
```

```
    for(int ele:map[key]){ //O(s), where s is the  
number of values against a particular key
```

```
        cout<<ele<<endl;
```

}

}