



CS 225

Data Structures

March 13 – Hashing

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Hashing



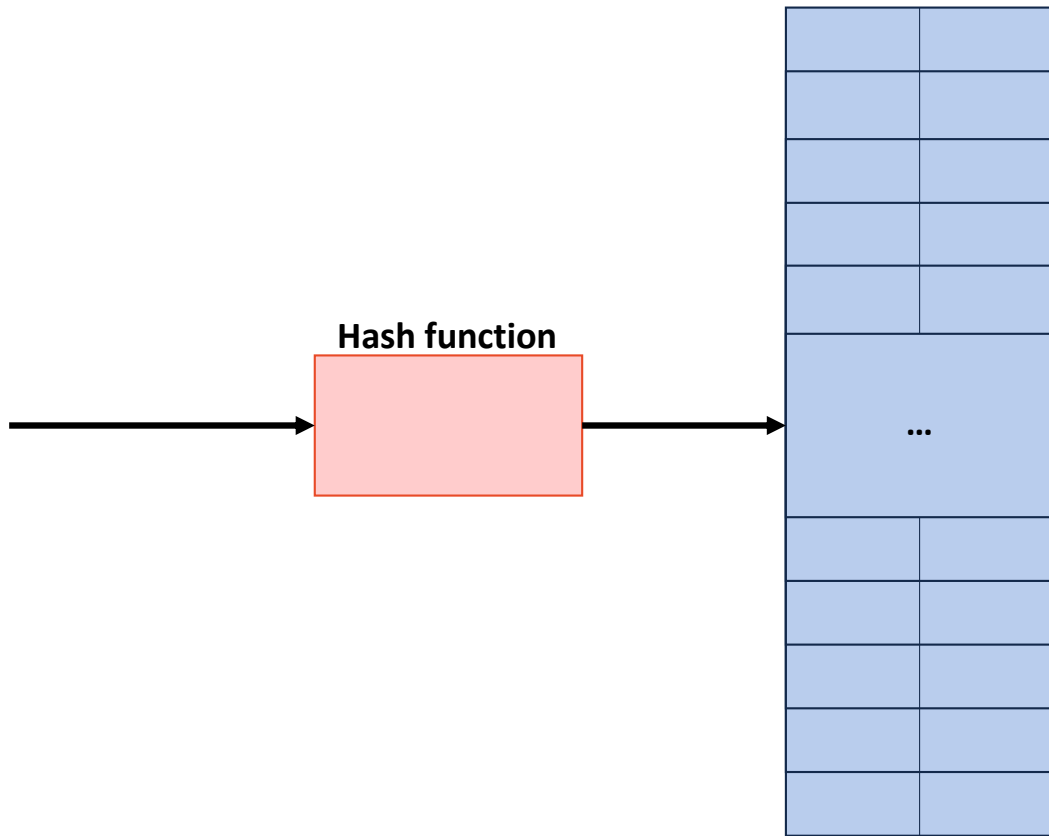
Hashing

Goals:

We want to define a **keyspace**, a (mathematical) description of the keys for a set of data.

...use a function to map the **keyspace** into a small set of integers.

Hashing



A Hash Table based Dictionary

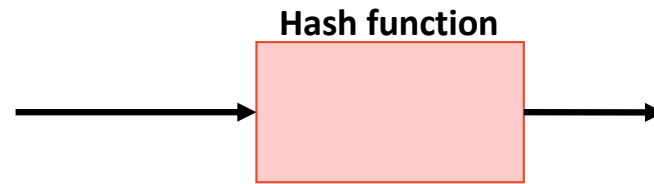
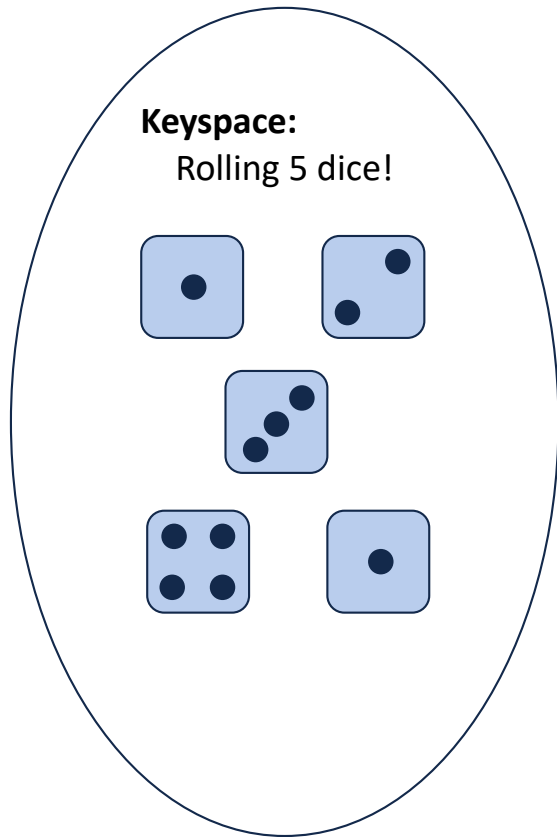
Client Code:

```
1 Dictionary<KeyType, ValueType> d;  
2 d[k] = v;
```

A **Hash Table** consists of three things:

1. A hash function, $f(k)$
2. An array
3. Something to handle chaos when it occurs!

A Perfect Hash Function



Key	Value
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	



Hash Function

Our **hash function** consists of two parts:

- A **hash**:
- A **compression**:

Choosing a good hash function is tricky...

- Don't create your own (yet*)
- Very smart people have created very bad hash functions

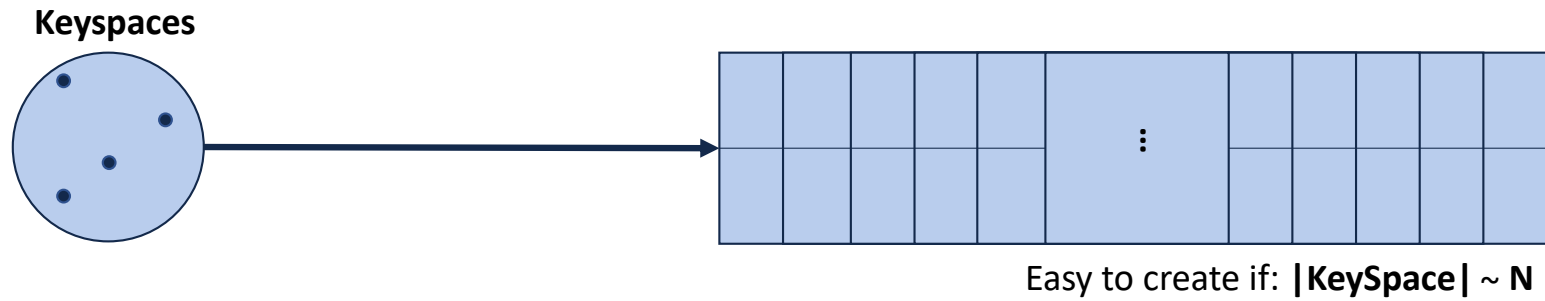


Hash Function

Characteristics of a good hash function:

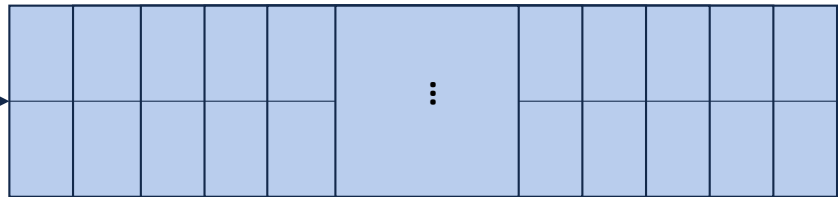
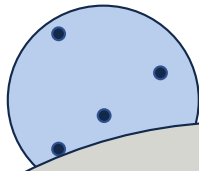
1. Computation Time:
2. Deterministic:
3. Satisfy the SUHA:

General Purpose Hash Function

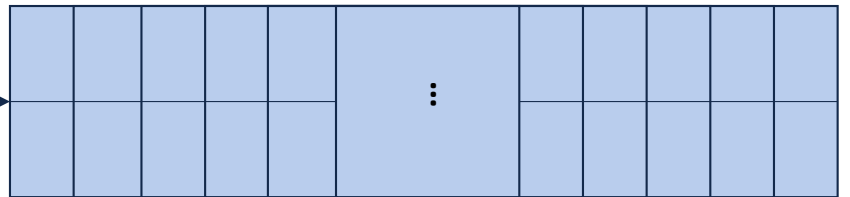
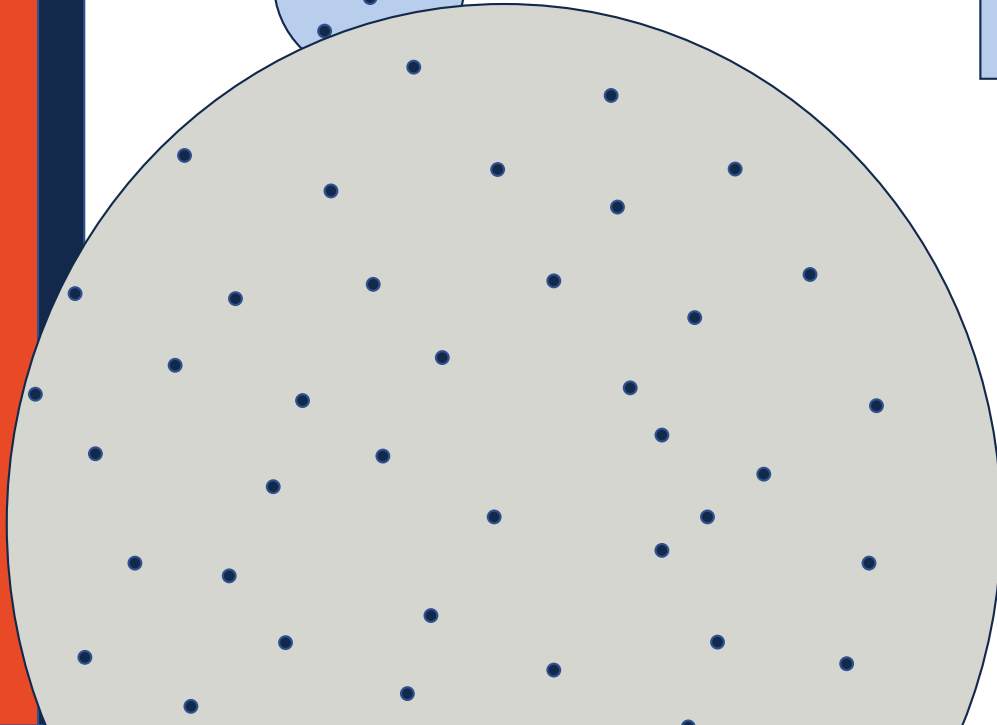


General Purpose Hash Function

Keyspaces

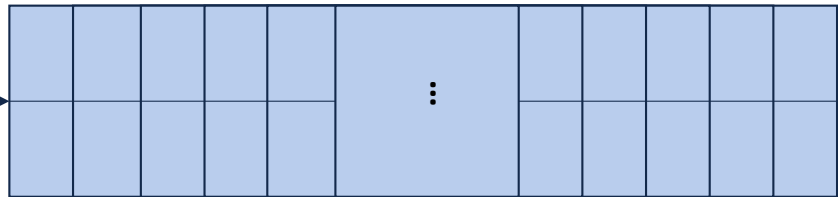
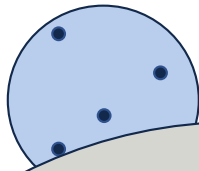


Easy to create if: $|\text{KeySpace}| \sim N$

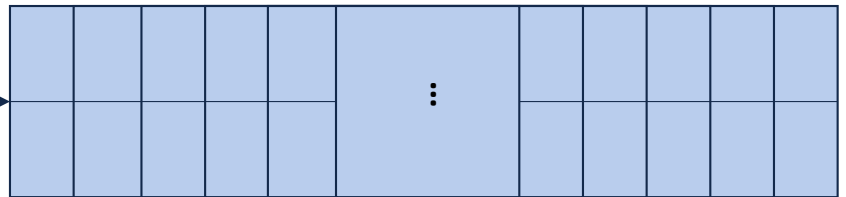
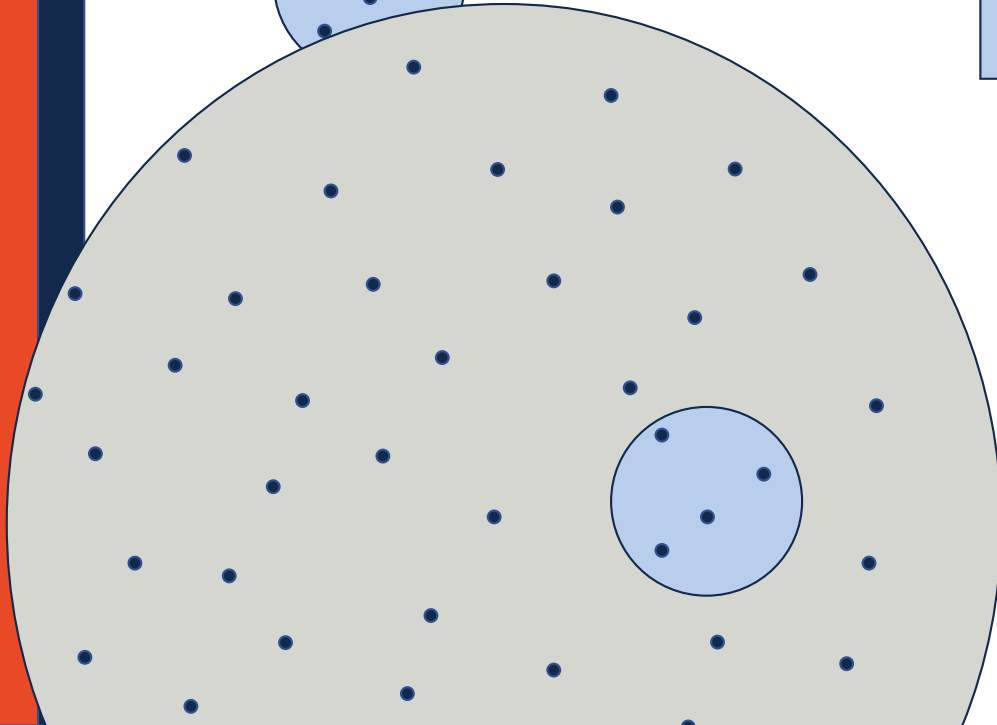


General Purpose Hash Function

Keyspaces



Easy to create if: $|\text{KeySpace}| \sim N$





MP5



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frantastic2021 @elise_marie28 !!!!

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