



CS 225

Data Structures

*March 13 – Hashing
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Hashing



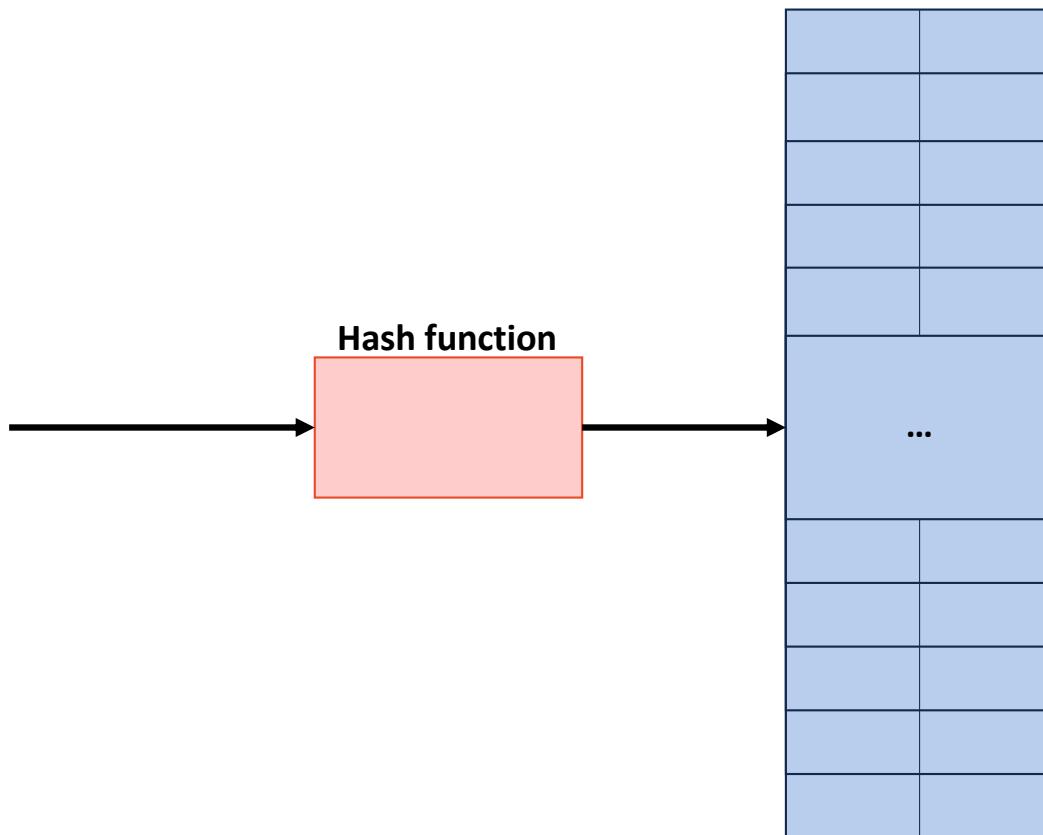
Hashing

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

(Angrave, CS 24)

(Beckman, CS 421)

(Cunningham, CS 210)

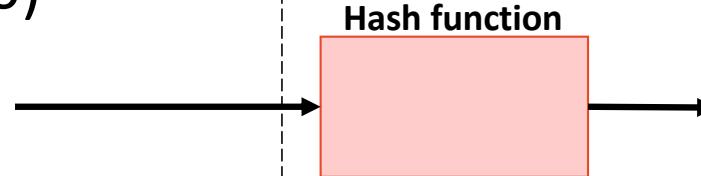
(Davis, CS 101)

(Evans, CS 126)

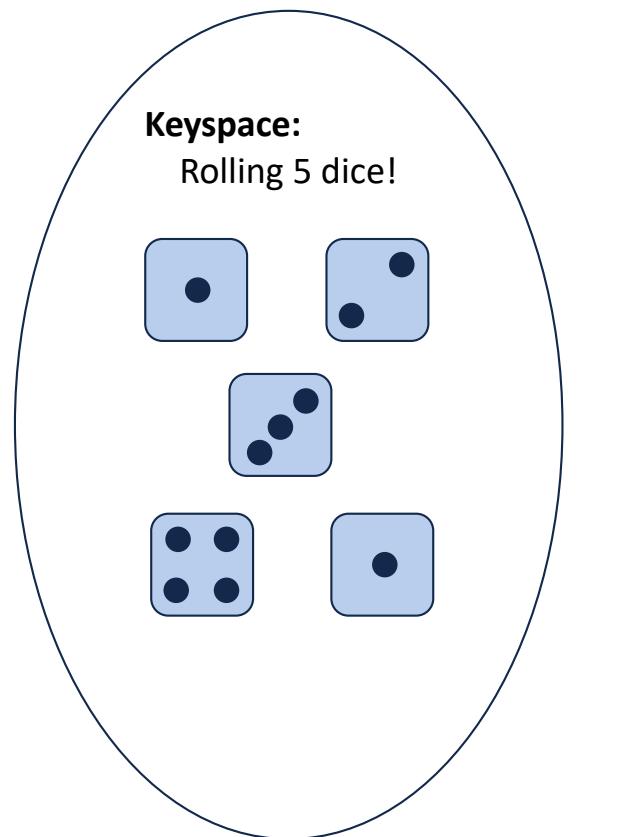
(Fagen-Ulmschneider, CS 225)

(Gunter, CS 463)

(Herman, CS 233)



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

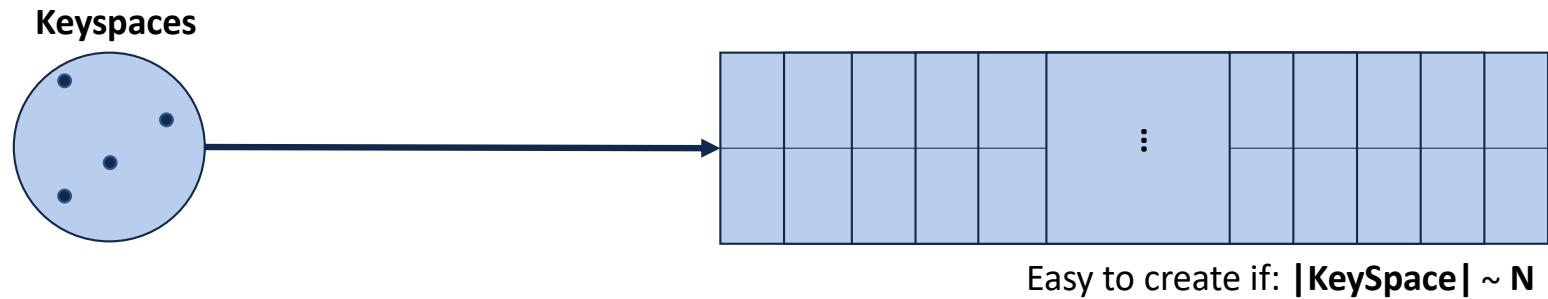


Hash Function

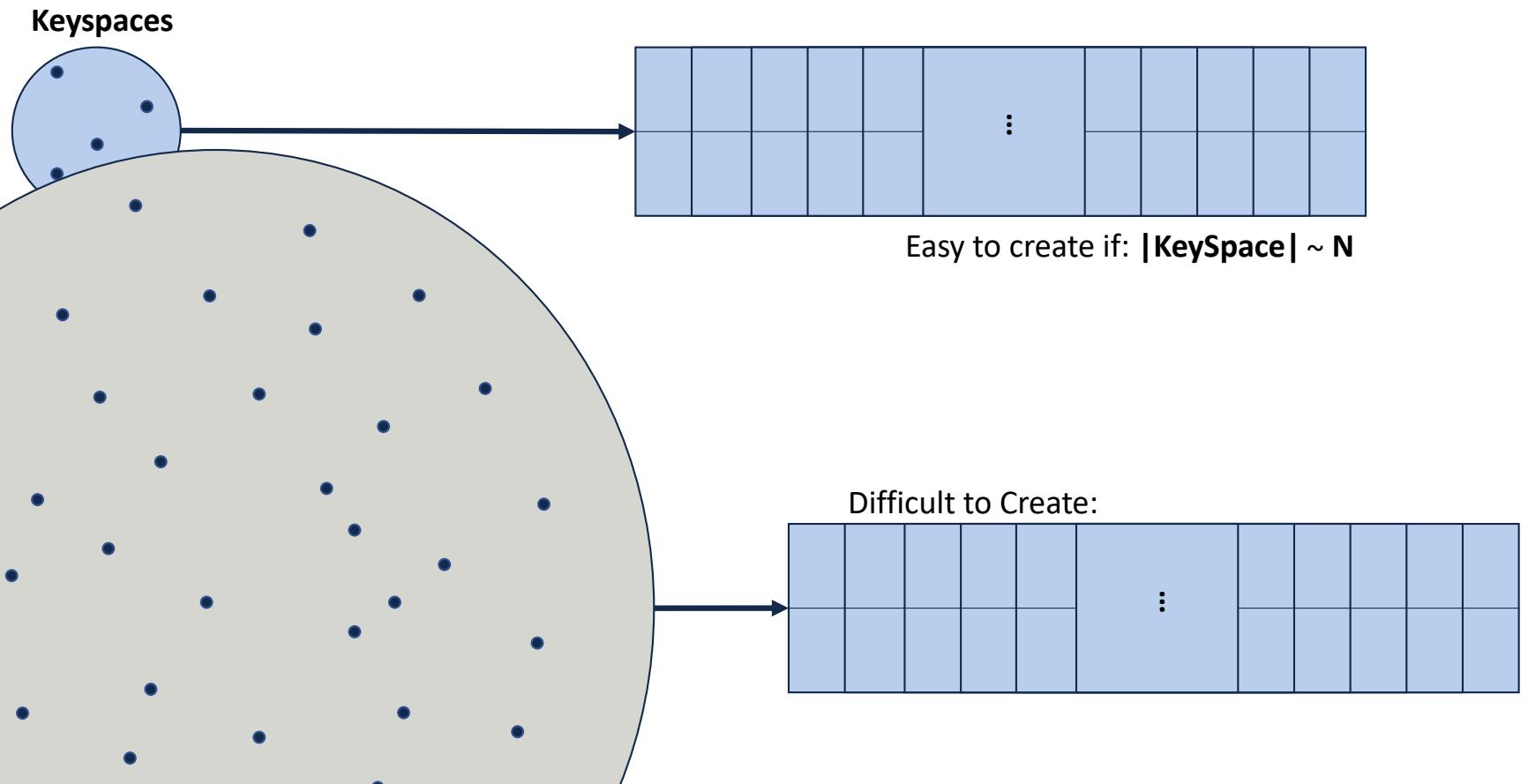
Characteristics of a good hash function:

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

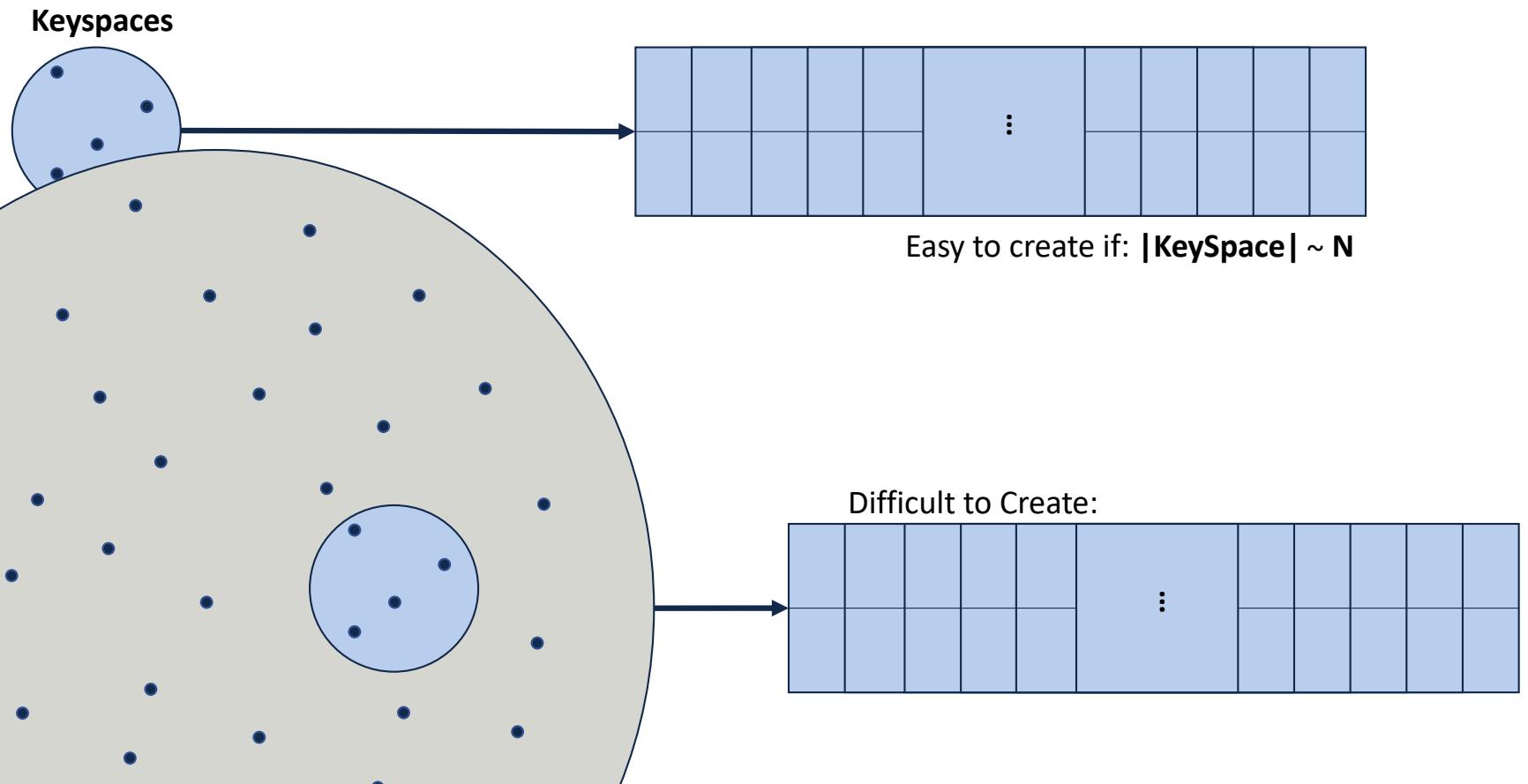
General Purpose Hash Function



General Purpose Hash Function



General Purpose Hash Function





MP5



illinois1867 • Follow

illinois1867 Serious #ILLINOIShomecoming question... how do you say "I-L-L" in dog language?

thejordanbarry Omg @emily_tyndorf your puppy is so famous

tessafulong @emily_tyndorf WHAT IS HAPPENING

tyndorfanne Rosy will be hosting a "meet and greet" for all that are interested 😊 #unofficialllinimascot ❤️

idesigner3 @meg733 정말 우리 사람이 됩 았다

frantastic2021 @elise_marie28 !!!!

meg733 @idesigner3 나이가 있어보이네

merdive_m12 😂 🍊 💥

allison_nichols4 @emily_tyndorf why am i not surprised that Rosy made the Illinois name 😂



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