

Lab_ Interning: String Interning Implementation

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298 no-space characters

```
MillisecondsPerSecond = 1000;  
SecondsPerMinute = 60;  
MinutesPerHour = 60;  
SecondsPerHour = SecondsPerMinute * MinutesPerHour;
```

```
def ConvertHourMinuteSecondToSeconds(  
    ElapsedHours,  
    ElapsedMinutes,  
    ElapsedSeconds) :  
    return [ElapsedHours * SecondsPerHour  
            + ElapsedMinutes * SecondsPerMinute  
            + ElapsedSeconds]
```

```
def HowManyElapsedHours(ElapsedSeconds) :  
    return [ElapsedSeconds / SecondsPerHour]
```

```
def HowManyElapsedMinutes(ElapsedSeconds) :  
    return [ElapsedSeconds / SecondsPerMinute  
            - (ElapsedSeconds / SecondsPerHour) * MinutesPerHour]
```

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```
id00 = 1000;  
id01 = 60;  
id02 = 60;  
id03 = id01 * id02;
```

199 no-space characters

```
def id04(  
    id05,  
    id06,  
    id07) :
```

```
    return [id05 * id03  
            + id06 * id01  
            + id07]
```

```
def id08(id07) :  
    return [id07 / id03]
```

```
def id08(id07) :  
    return [id07 / id01  
            - (id07 / id03) * id02]
```

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33% reduction in size

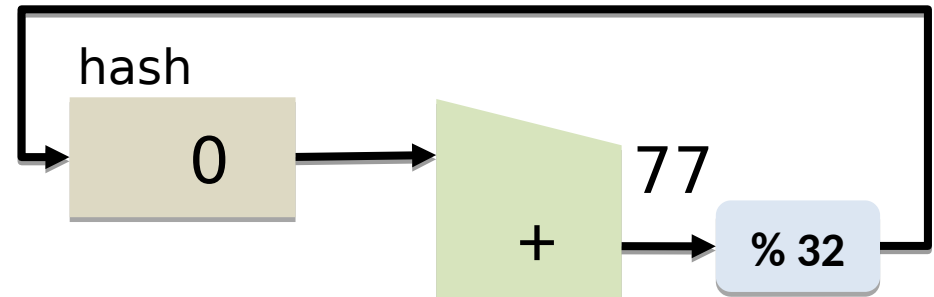
Hashing Algorithm

13

```
data[ ]  
hash = 0
```

```
for d in data  
do
```

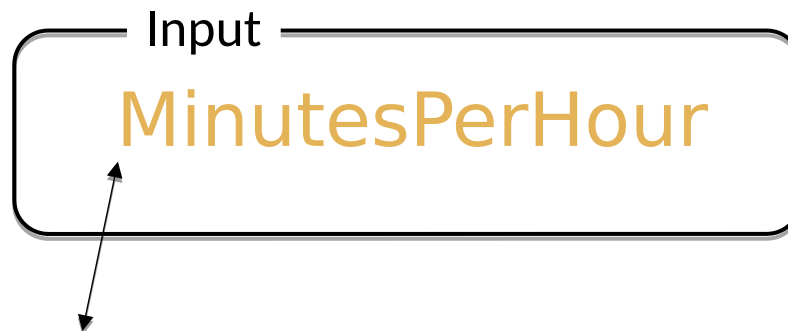
```
    hash = (hash + d) mod n  
return hash
```



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ASCII Codes: 77

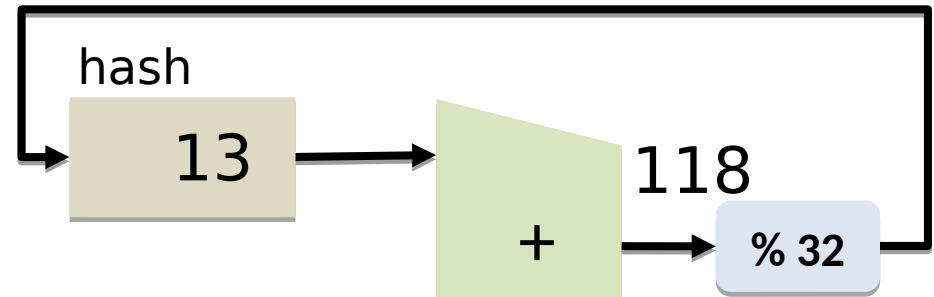
Hashing Algorithm

22

```
data[ ]  
hash = 0
```

```
for d in data  
do
```

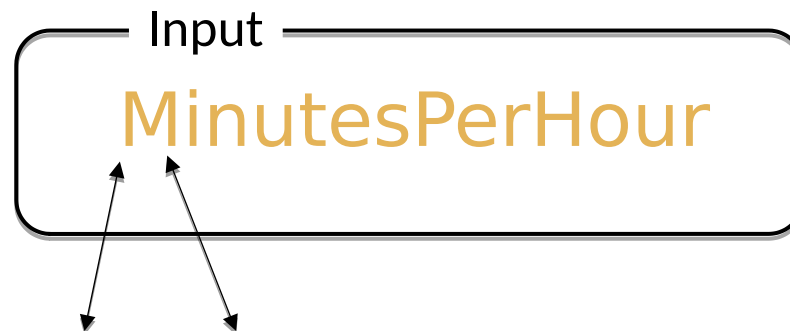
```
    hash = (hash + d) mod n  
return hash
```



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ASCII Codes: 77 105

Hashing Algorithm

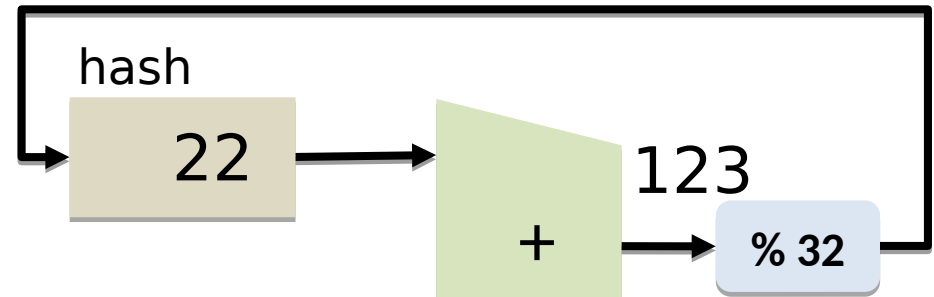
27

```
data[ ]  
hash = 0
```

```
for d in data  
do
```

```
    hash = (hash + d) mod n
```

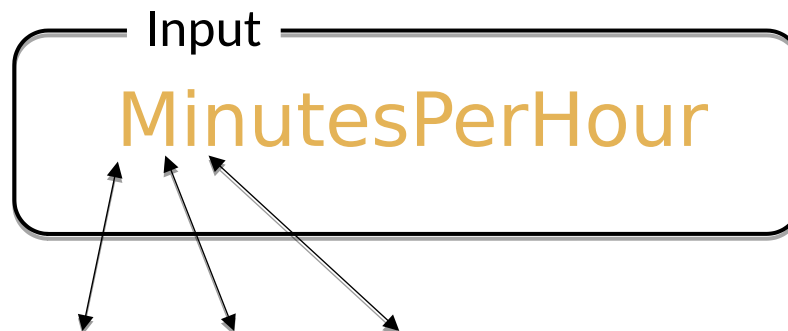
```
return hash
```



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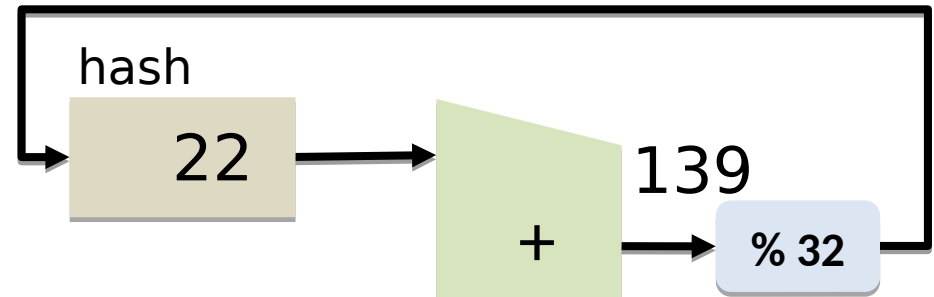
ASCII Codes: 77 105 110

Hashing Algorithm

```
data[ ]  
hash = 0
```

```
for d in data  
do
```

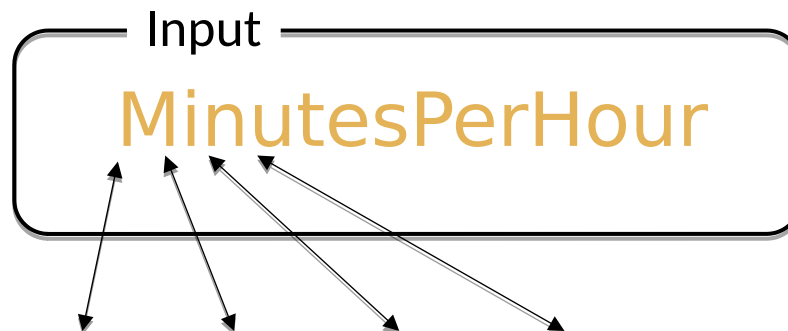
```
    hash = (hash + d) mod n  
return hash
```



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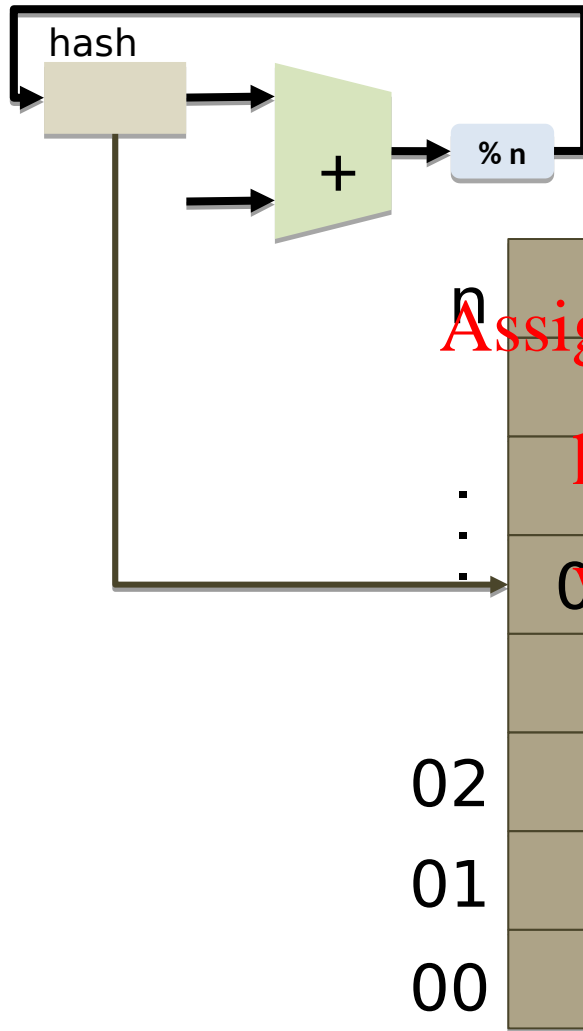
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ASCII Codes: 77 105 110 117 ...

<string>

String Interning Table



Each one of these entries in the table is called a *bucket*

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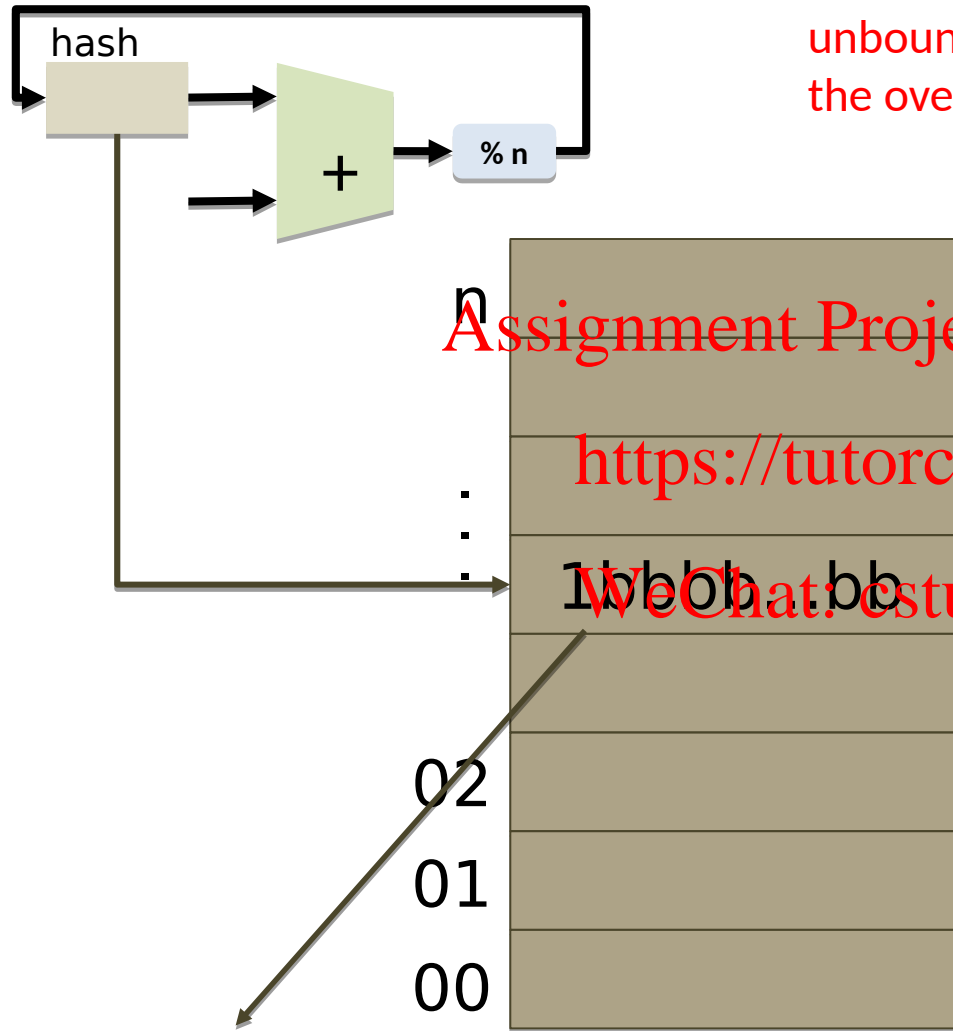
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- **Create** immutable copy
- **Place** address of immutable copy into the table entry.
- **Return** unique ID

<string>

String Interning Table

In this slides we will refer to the unbounded data structure used for the overflowing of a bucket as a **tank**



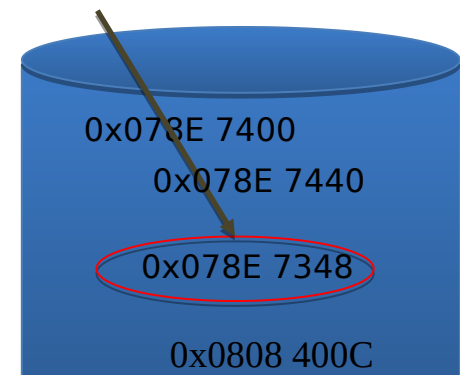
Search tank for string.

If not found:

- **create** immutable copy
- **insert** string into tank.
- **return** unique id

If found:

- **return** unique ID.



<string>

String Interning Table

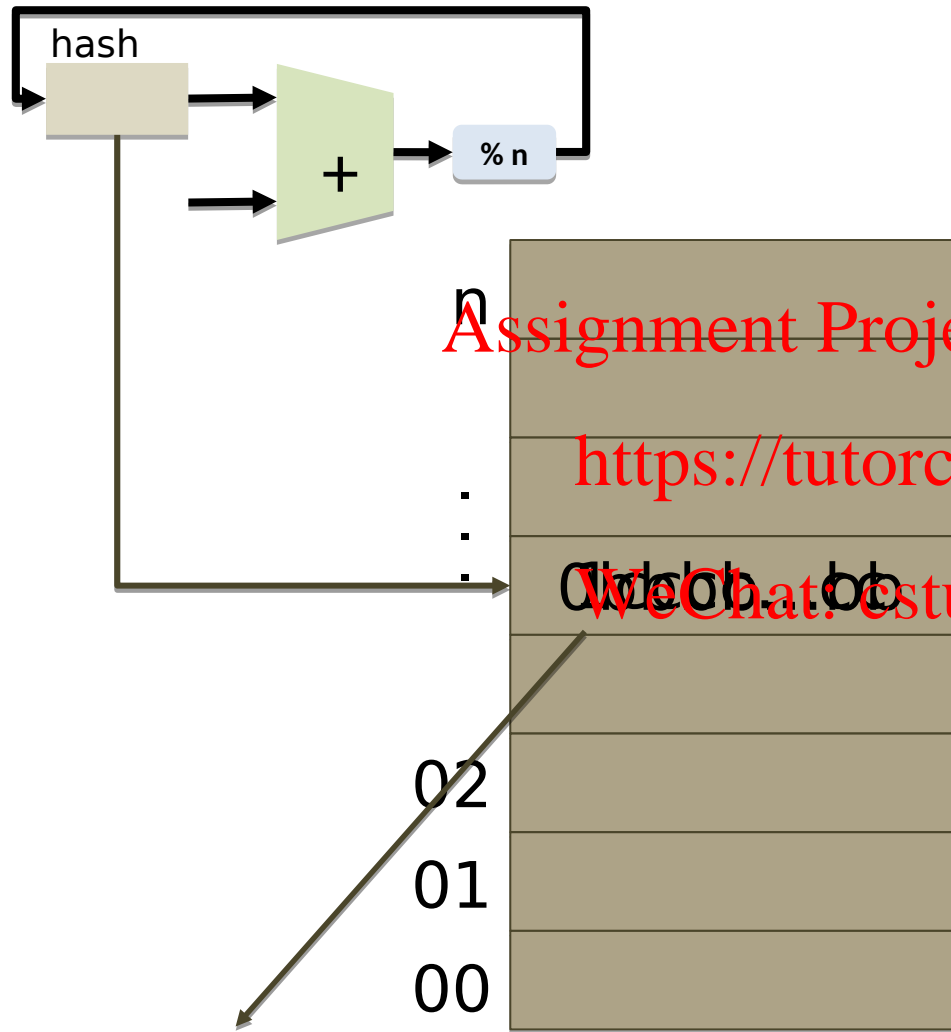
Compare input with
interned string.

If it matches:

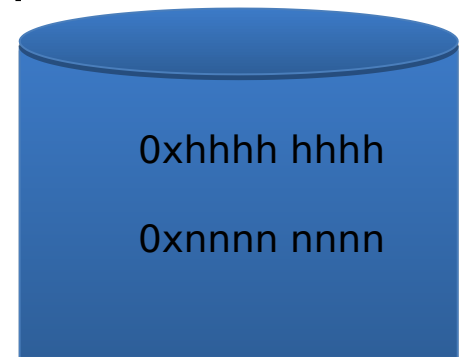
- **return** unique id

If it does not match:

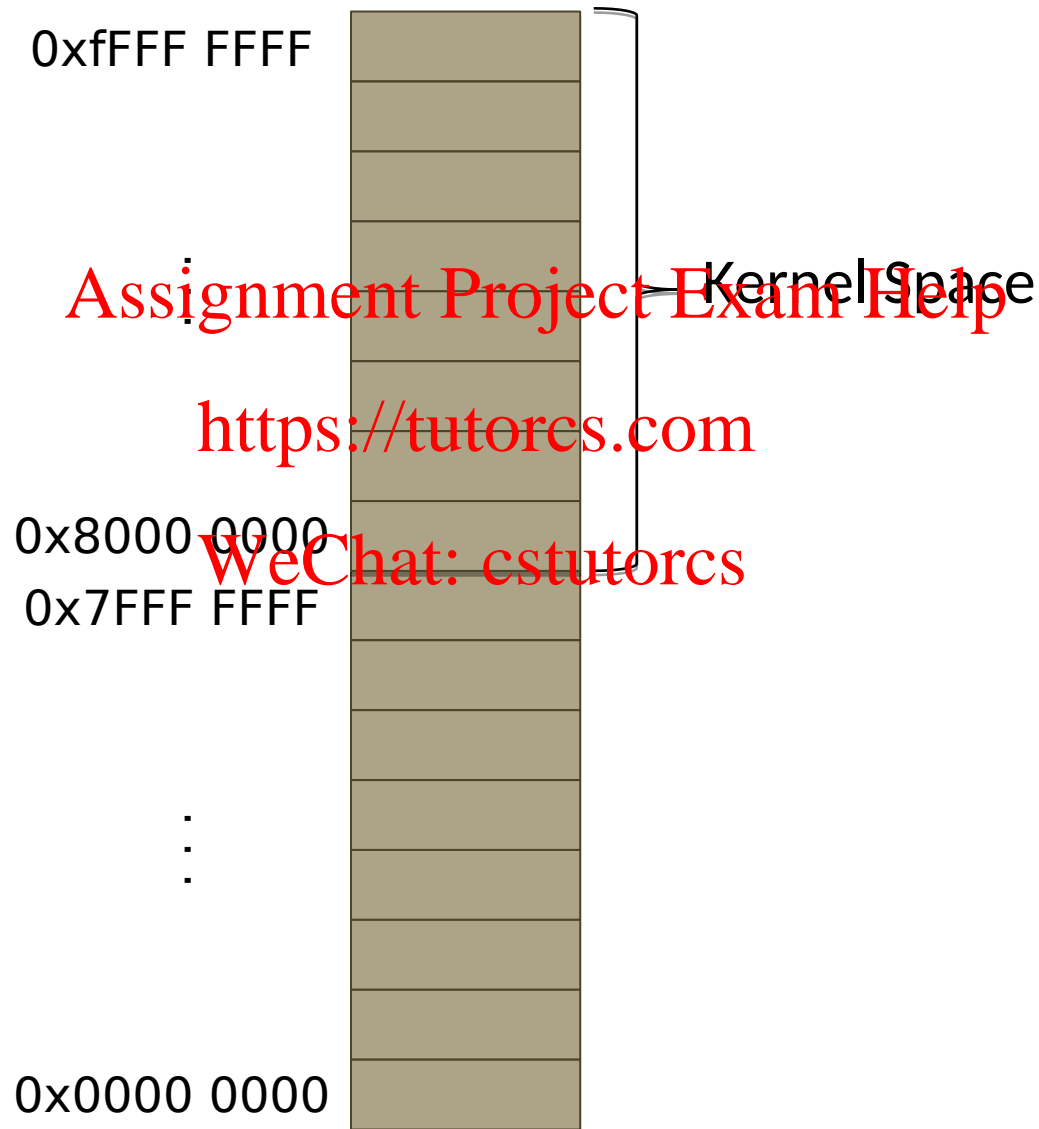
- **create** a new tank.
- **add** interned string address
- **create** immutable copy
- **add** copy address
- **replace** bucket content
- **return** unique ID



0bbb...bb is the address of
an interned string



Why this works?



internString

Parameter:

a0: address of a string to be interned

Return Value: Assignment Project Exam Help

a0: unique ID for the string

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Strings with same value must always return the same ID independent of their memory address.

Must create immutable copy if string was not interned before.

getInternedString

Parameter:

a0: unique interned string ID

Return Value: Assignment Project Exam Help

a0: string address if string was interned before.

a0: 0 if string was not interned before.

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internFile

Parameter:

a0: pointer to a file in mutable memory

Return Value: Assignment Project Exam Help

a0: address of list of interned strings

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a1: number of identifiers in the list

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- strings are separated by one or more spaces or line feed characters
- end of file is signaled by an End of Transmission (EOT) character
- must make immutable copies of each string.

Guarantee

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Your implementation will be presented with
at most 128 different strings.

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