File Edit View Help

File Edit View Help

Even More Programming Review

File Edit View Help

Big Example

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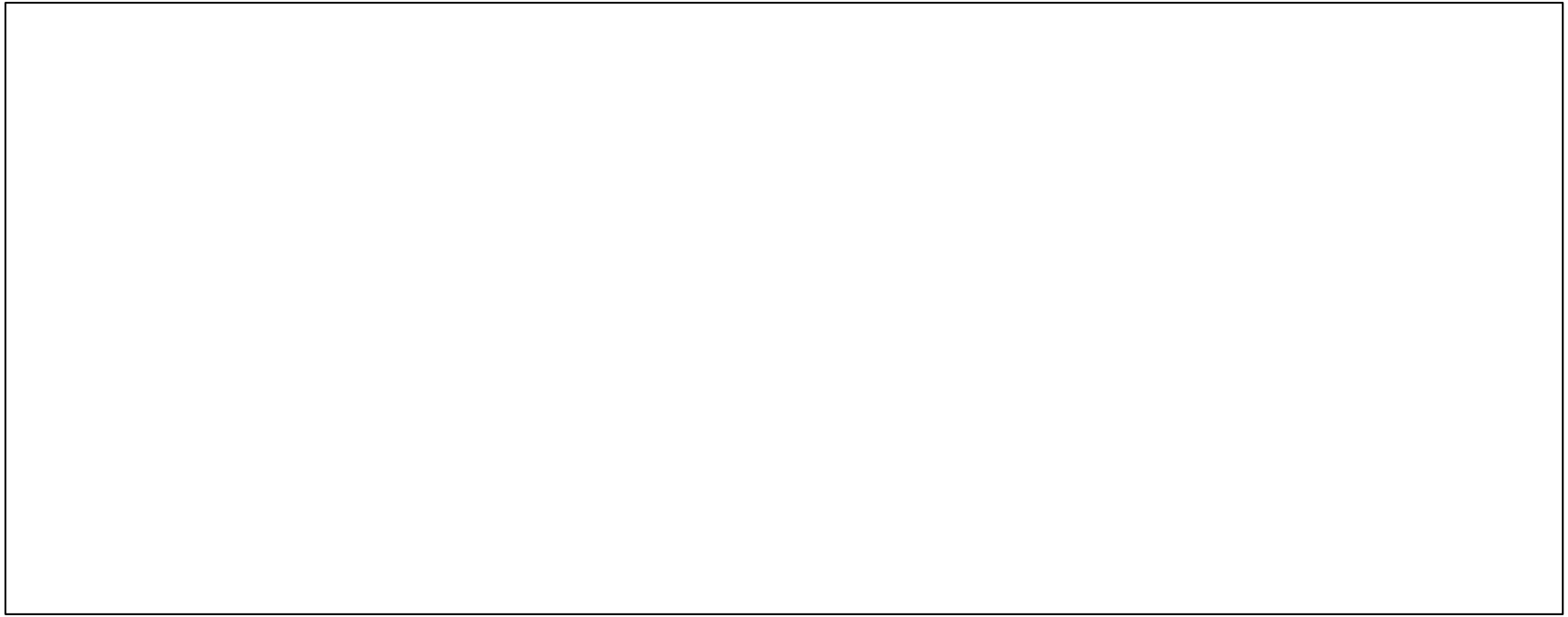
Problem



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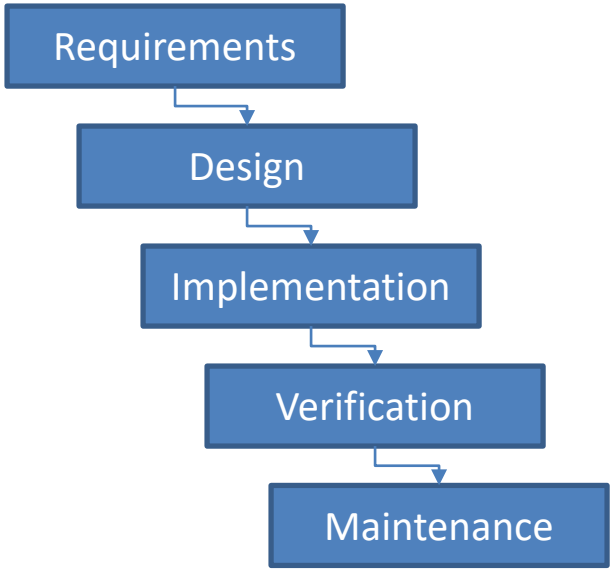
Problem

Problem

- Problem to Solve
  - Keep track of Tacos that I like
- Create Solutions to Problems
- Waterfall Model
  - Requirements
  - Design
  - Implement
  - Verification
  - Maintenance

Waterfall Model



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Requirements

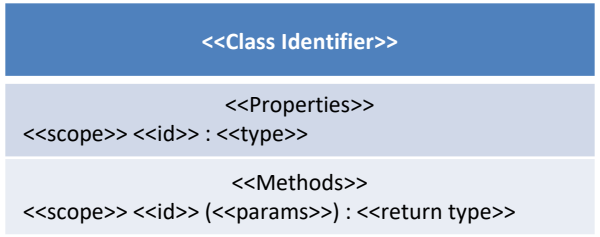
- Keep Track of important Taco Information
- Taco's Information
  - Name
  - Location
  - Price

- Should be able to
  - Add a Taco
  - Remove a Taco by Name
  - Sort by Price
  - Display all Taco information
  - Store in a Taco File
  - Read from Stored Taco Files
- Clear and Simple Front End

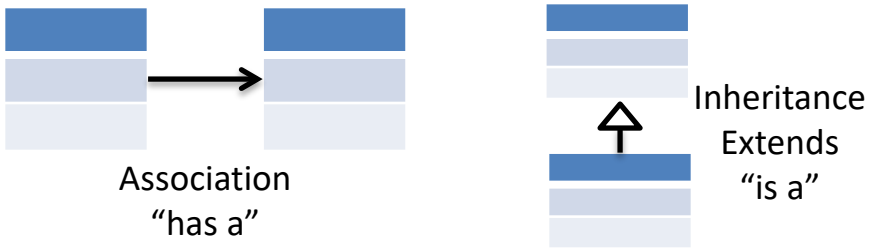
Design

- Separate Front End from Back End
- UML Class Diagram
  - Boxes are Structures (like Classes)
  - Arrows are relationships between structures
- Classes
  - Name of the class
  - Properties
  - Methods
  - "+" / "-" means scope is public or private
- Arrows
  - Stick arrow is the Association or "has a"
    - Numeric values indicate the number of instances
  - Block Arrows is the Inheritance or "is a"
- Static variables and method are underlined
  - Constants are all UPPER CASE

UML Class Diagram



UML Class Diagram Arrows



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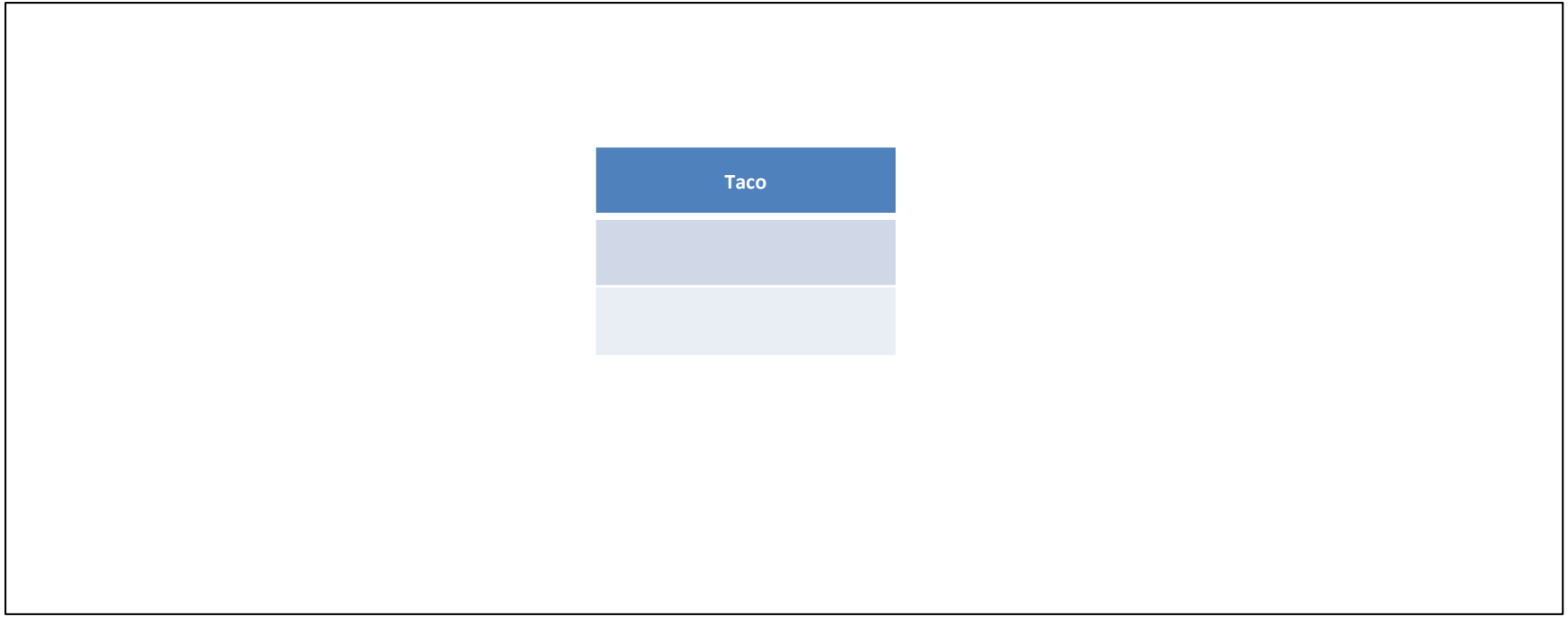
Design



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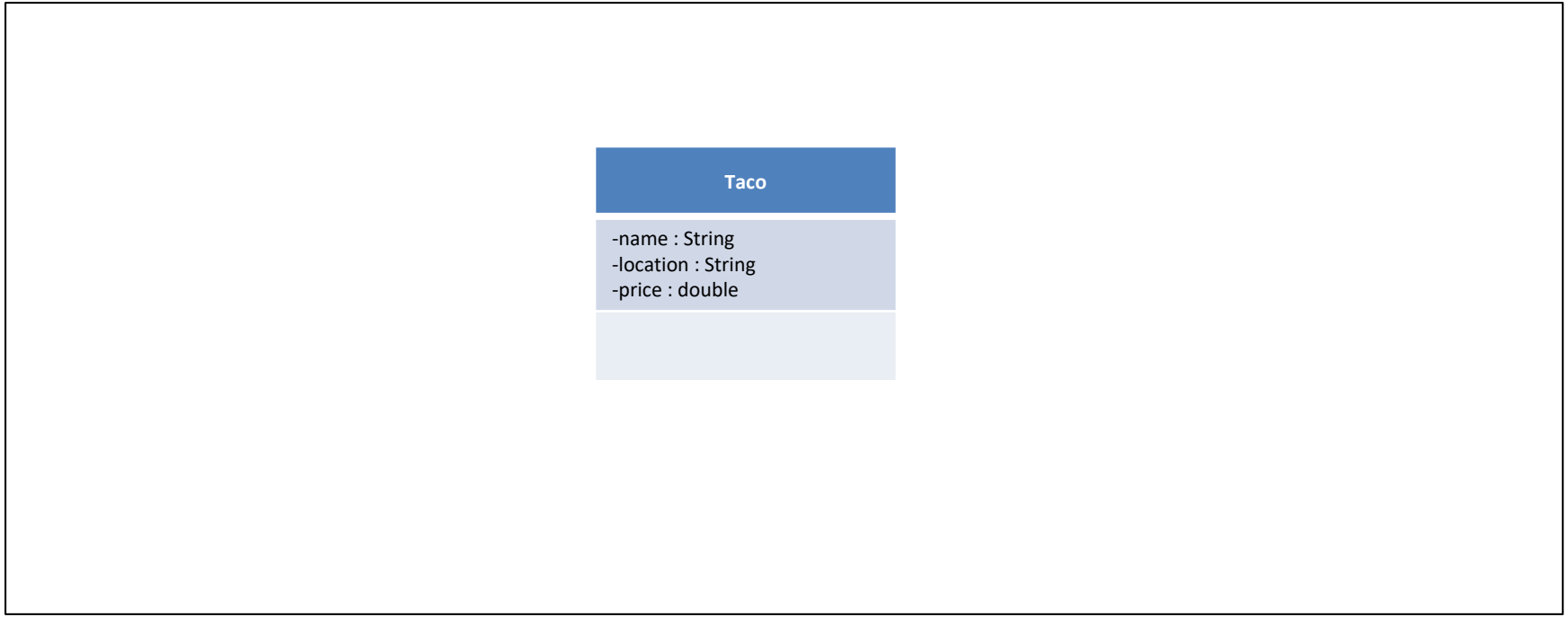
Design



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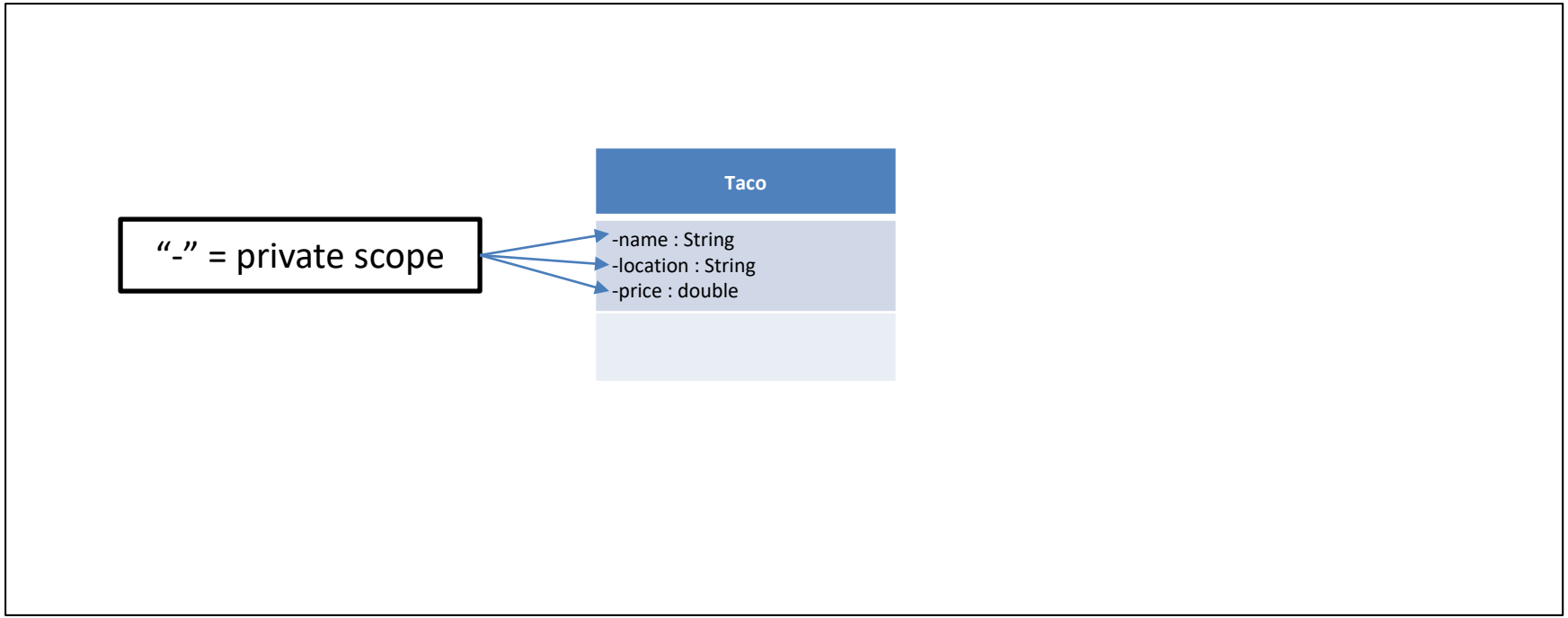

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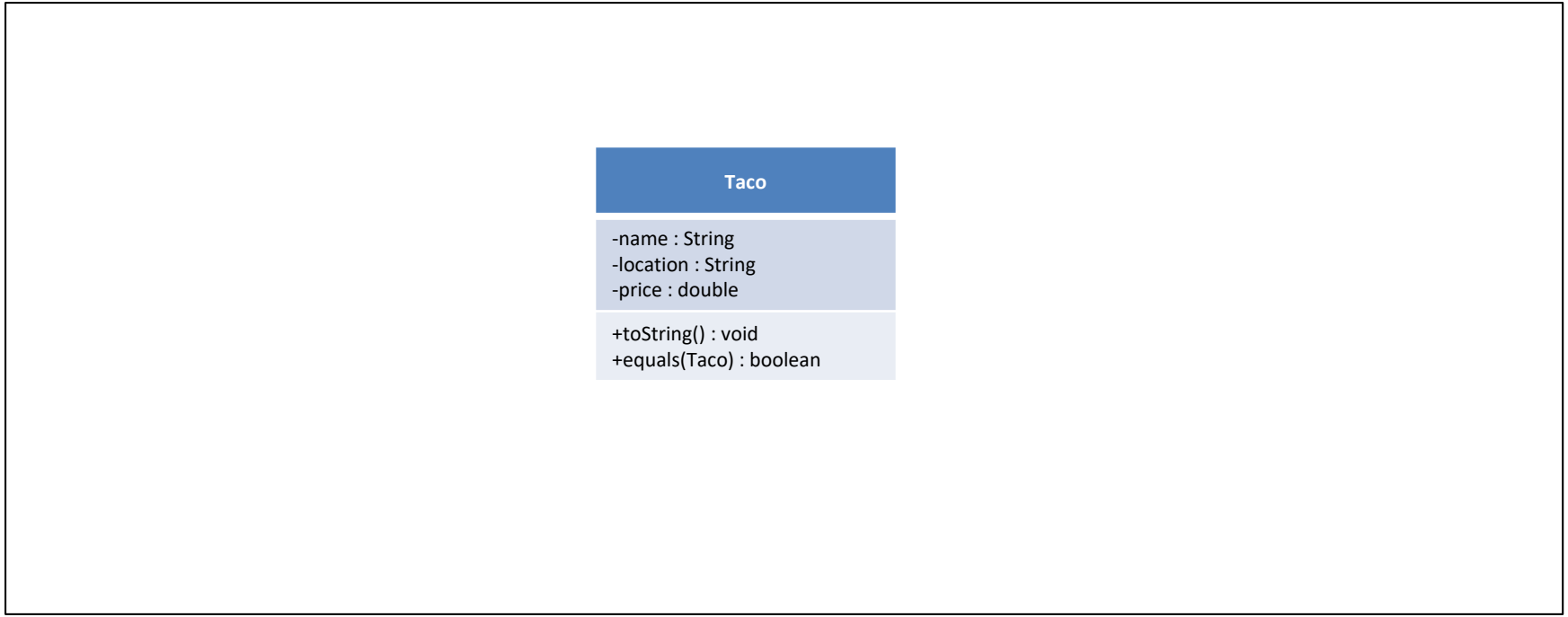

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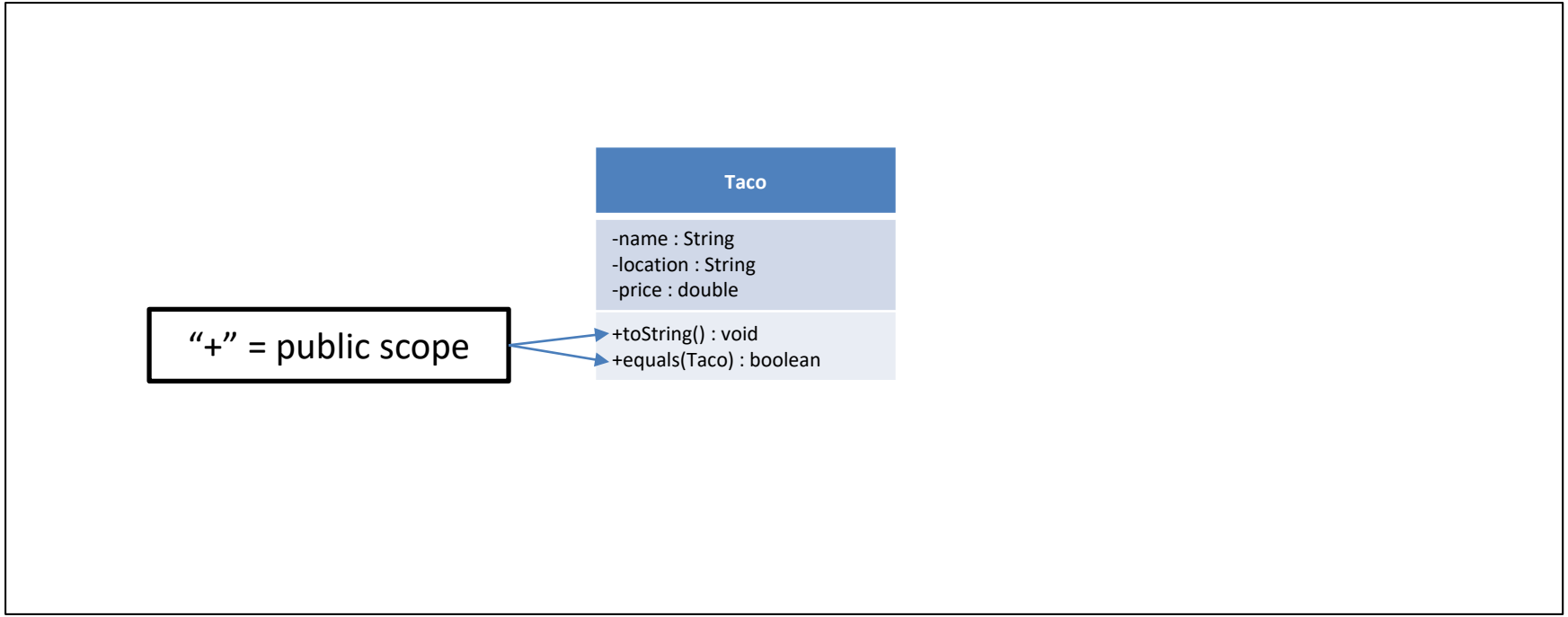

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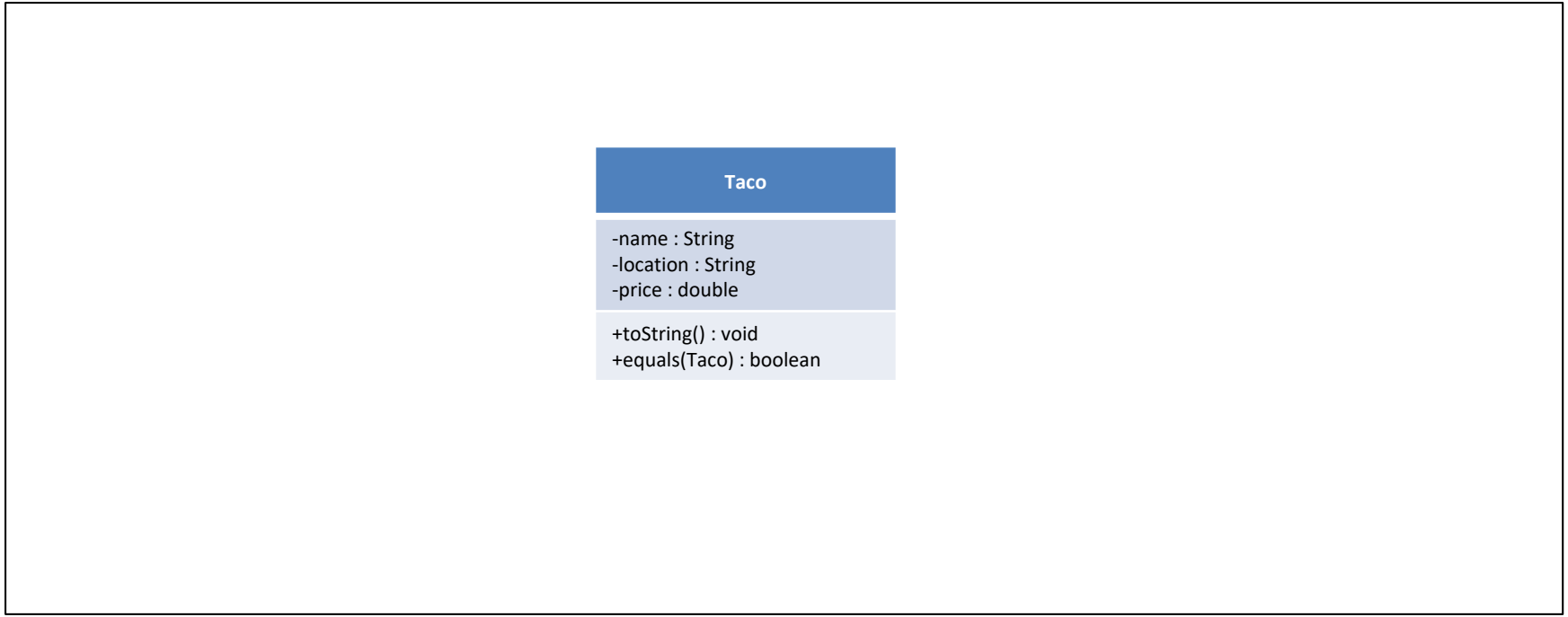

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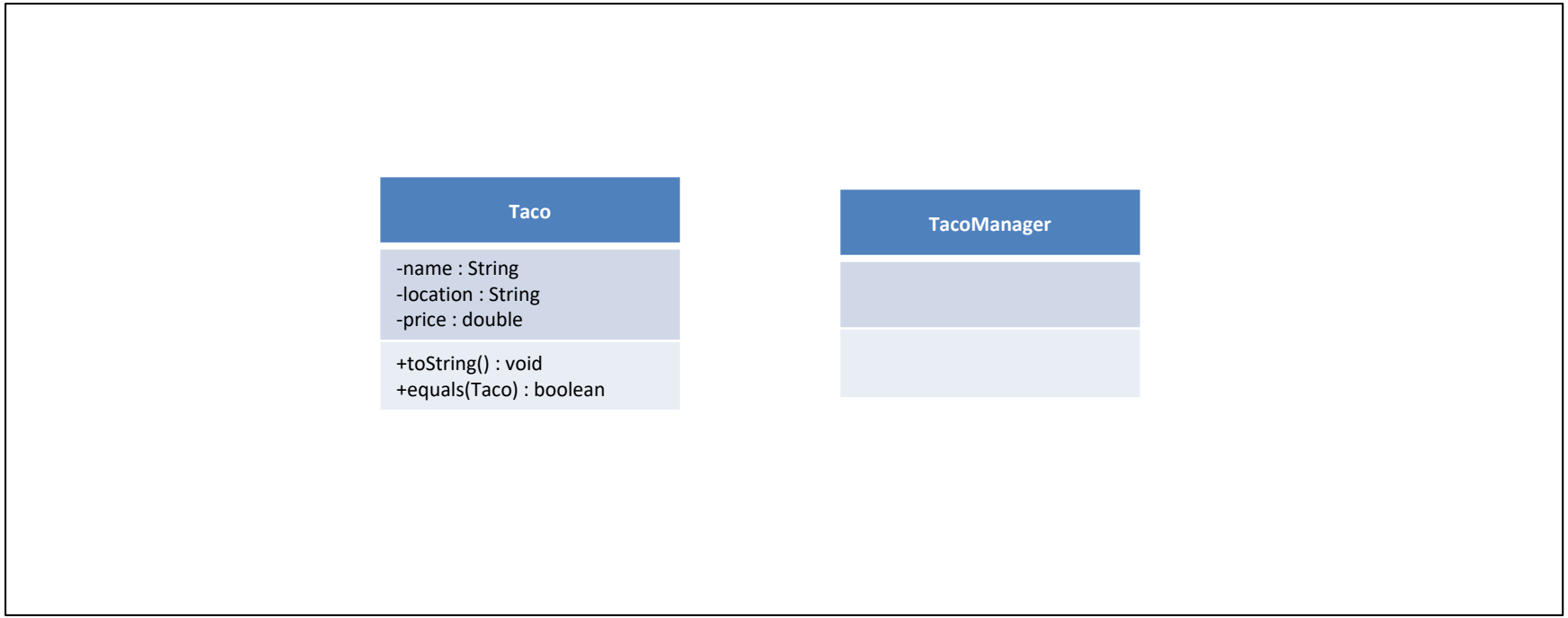

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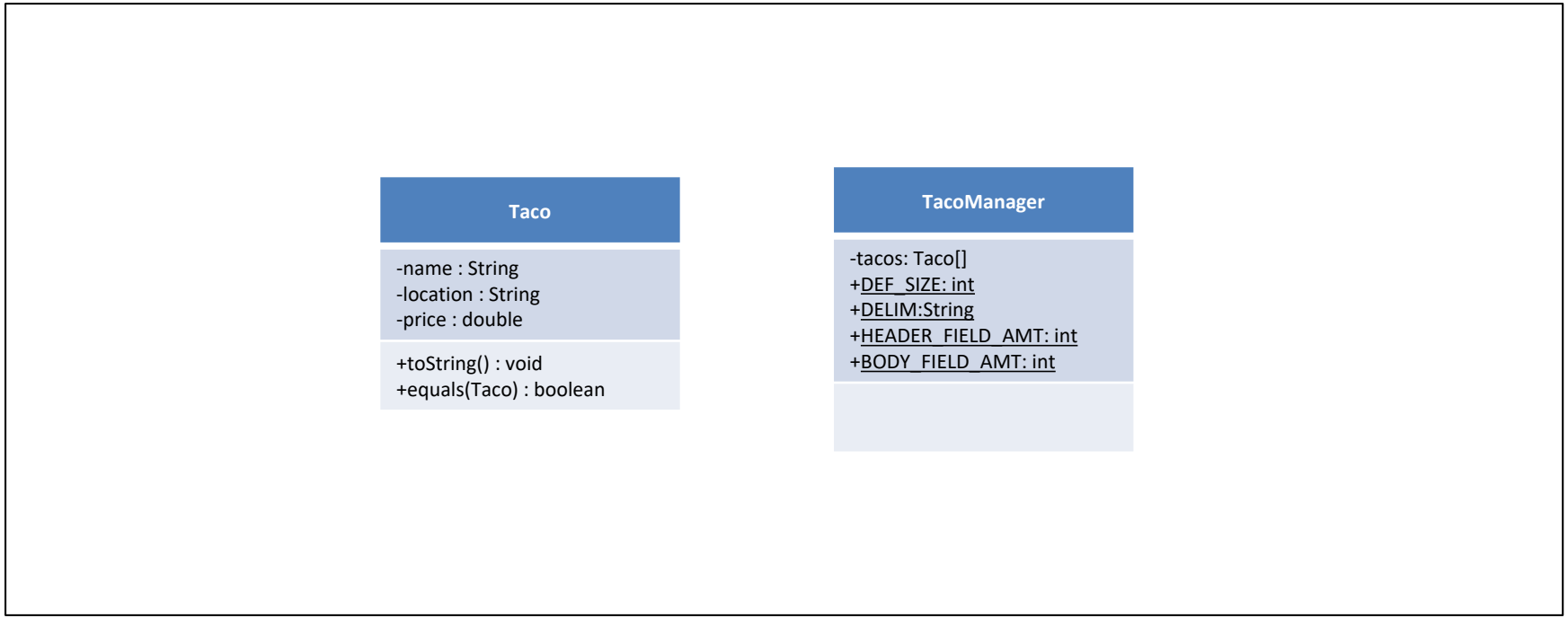

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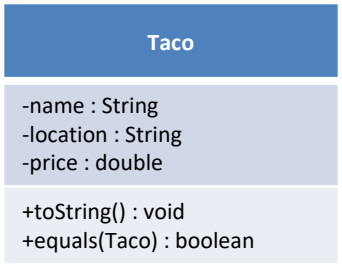
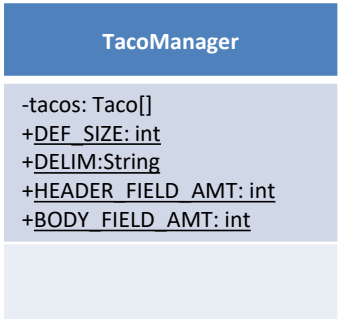




File Format

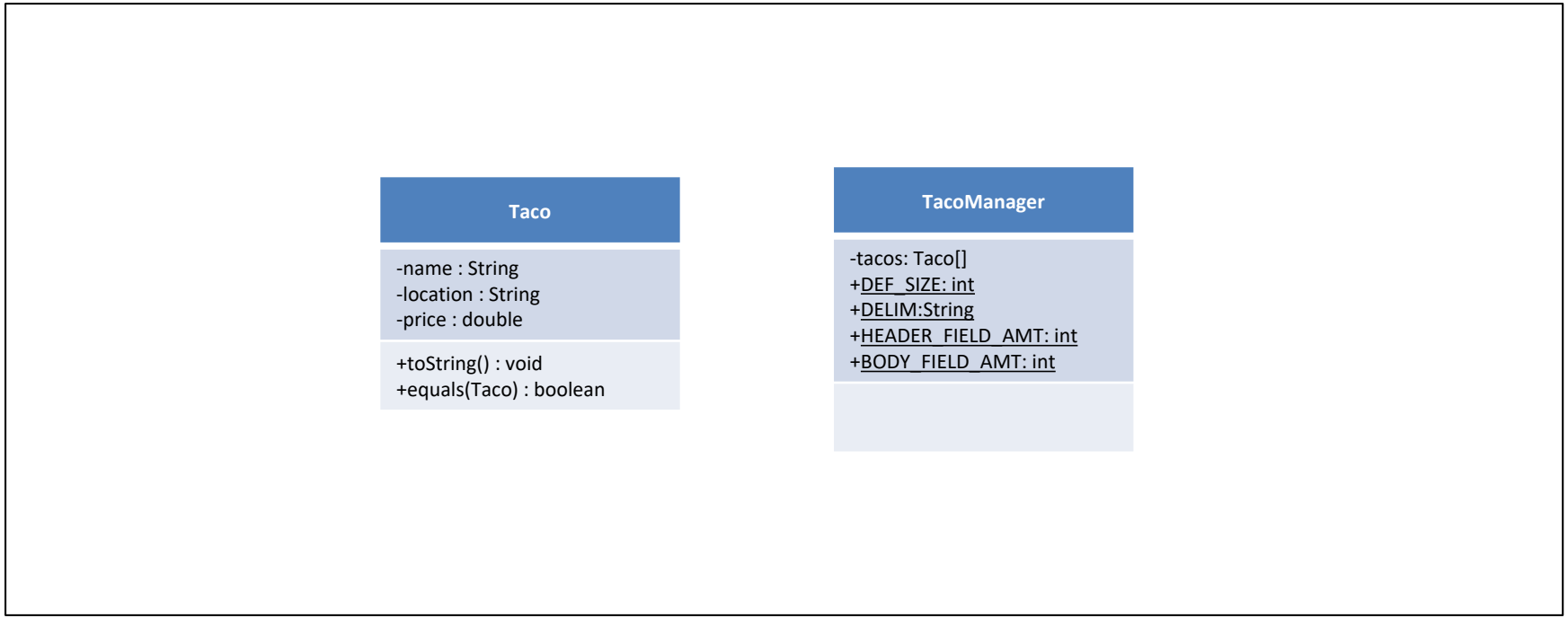
```
//Header
Taco Amt:\t<<number of tacos>>\n
//Body
<<name>>\t<<location>>\t<<price>>\n
…
```

Example

```
Taco Amt:  3
Name1      location1  1.0
Name2      location2  2.0
Name3      location3  2.5
```

File Edit View Help

Design



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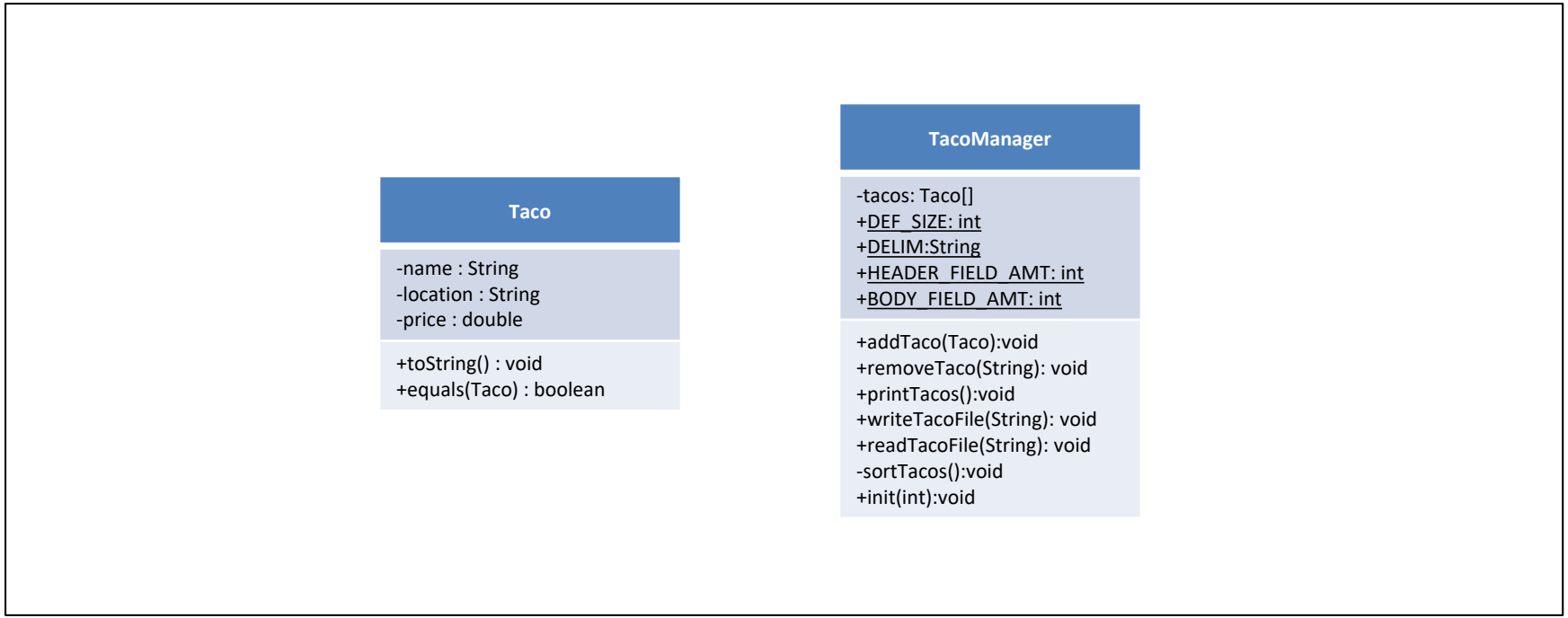
Design



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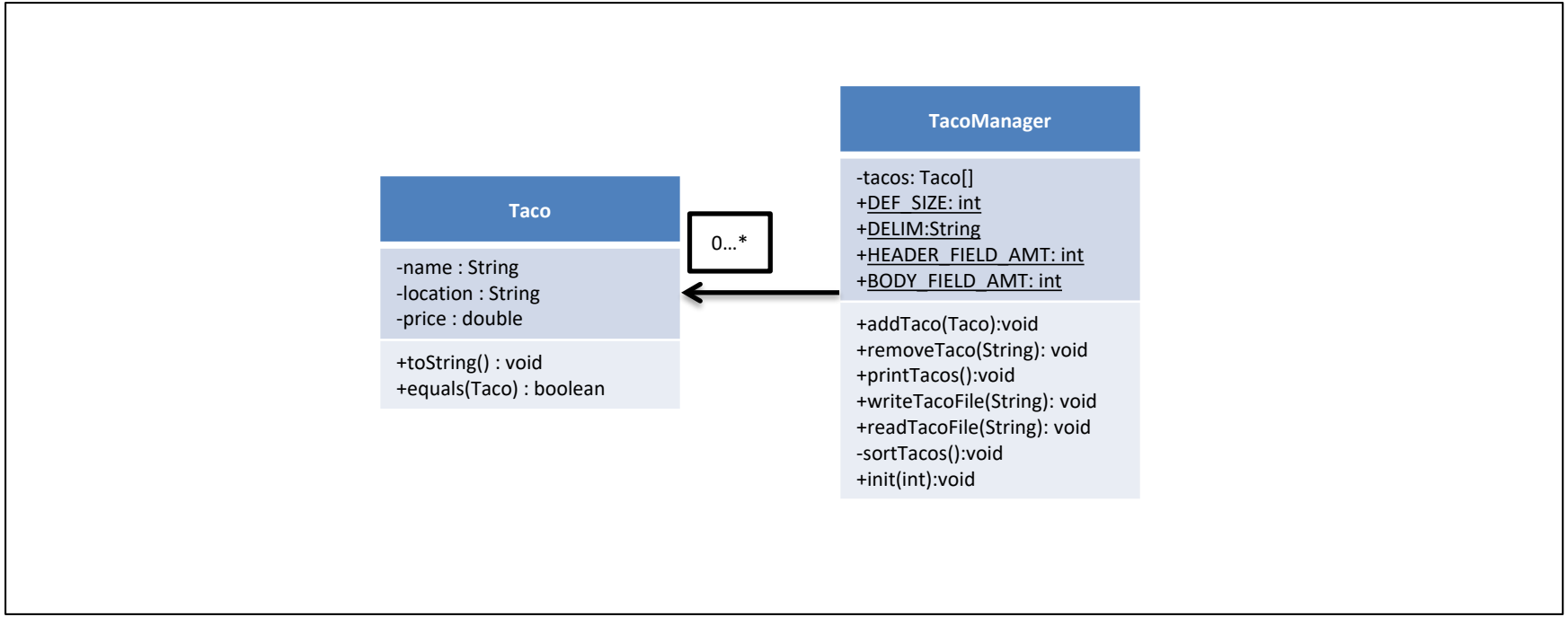

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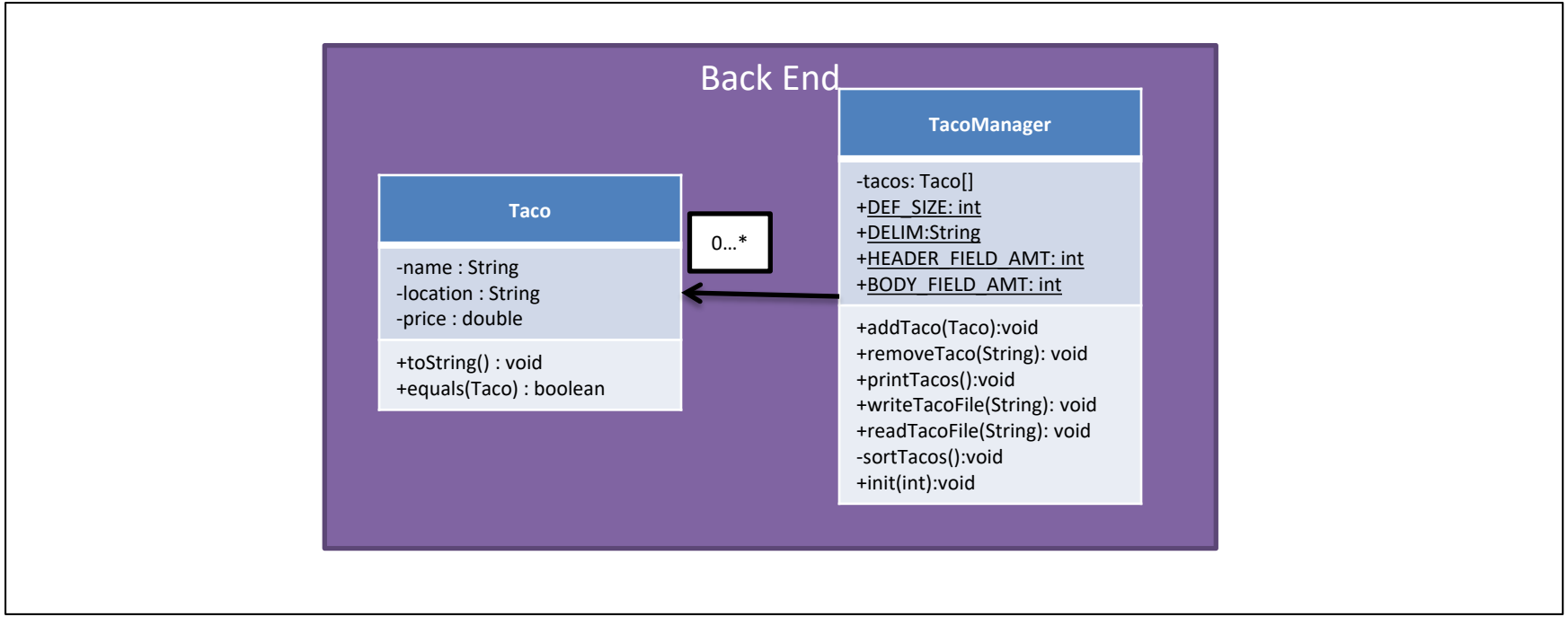

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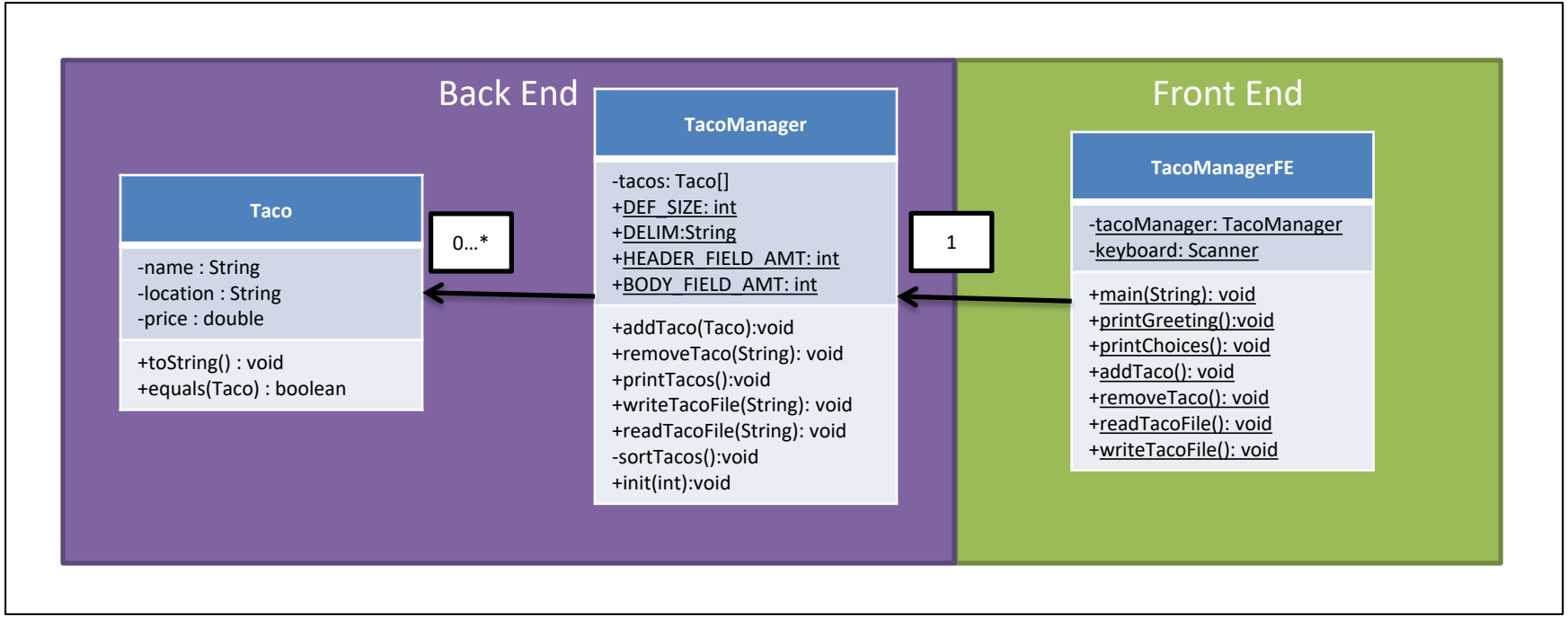

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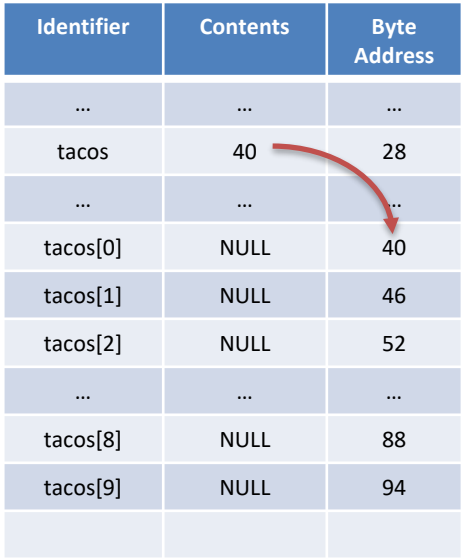
Implementation

Taco Array Structure

- Arrays of Objects are Arrays of Memory Addresses
- Arrays are considered Object Types in Java
- The Array's identifier points to the contents of the array
- The Array's indices point to the contents of the constructed Objects
- Default values for Object Arrays are considered NULL



Identifier	Contents	Byte Address
…	…	…
tacos	40	28
…	…	…
tacos[0]	NULL	40
tacos[1]	NULL	46
tacos[2]	NULL	52
…	…	…
tacos[8]	NULL	88
tacos[9]	NULL	94

Taco Array Structure

Identifier	Contents	Byte Address
…	…	…
tacos	NULL	28
…	…	…

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Taco Array Structure

- Keeping constructed Objects to one side
- No NULL elements in between constructed Objects
- First NULL Element means everything after that is also assumed NULL
- Adding
  - Start from the first Index
  - Find first null element
  - Assign value to there
- Removing
  - Start from the first Index
  - Find the element to remove's index
  - If not found then return
  - Then shift over by one (tacos[i] = tacos[i+1]
  - Set last element to NULL

Identifier	Contents	Byte Address
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Identifier	Contents	Byte Address
…	…	…
tacos	40	28
…	…	…
tacos[0]	86	40
tacos[1]	NULL	46
tacos[2]	NULL	52
…	…	…
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tacos[0]	86	40
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tacos[2]	NULL	52
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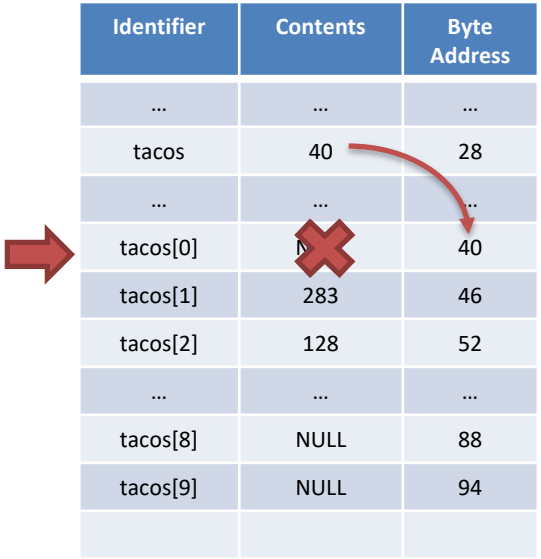

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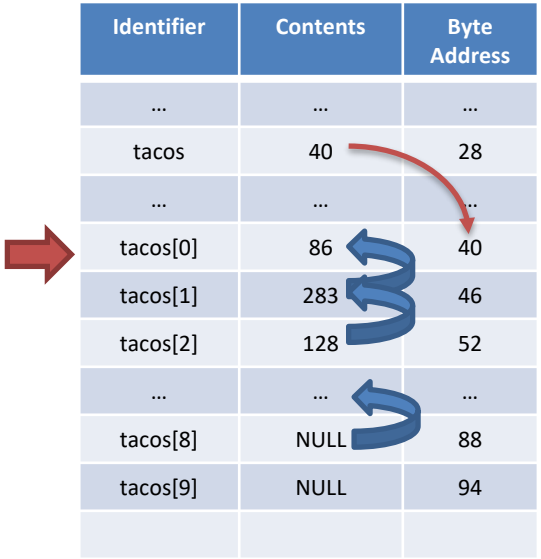

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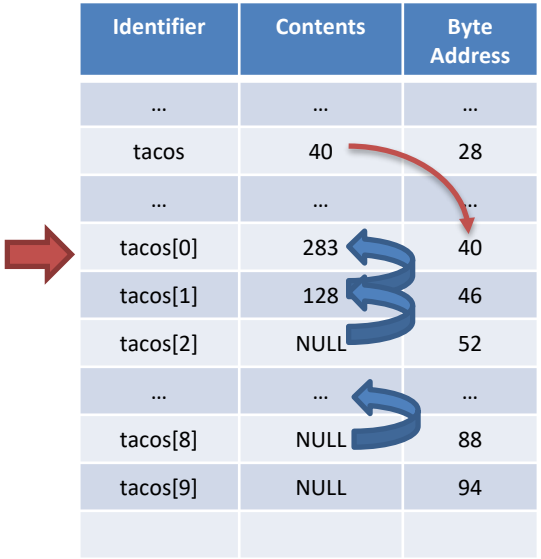

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Add Tacos Demo

```
public void init(int size)
{
    if(size >= 1)
        tacos = new Taco[size];
    else
        tacos = new Taco[DEF_SIZE];
}
public void addTaco(Taco aTaco)
{
    //Check if taco array is full
    if(tacos[tacos.length-1] != null)
    {
        System.out.println("The taco database is full");
        return;
    }
    //Find the first empty space
    for(int i=0;i<tacos.length;i++)
    {
        if(tacos[i] == null)
        {
            tacos[i] = aTaco;
            break;
        }
    }
    //sort it
```

Memory

Identifier	Contents	Byte Address
...	...	...
tacos	NULL	28

More Memory

Identifier	Contents	Byte Address
...	...	...

File Edit View Help

Add Tacos Demo

4

```
public void init(int size)
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More Memory

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File Edit View Help

Add Tacos Demo

4

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tacos	NULL	28

More Memory

Identifier	Contents	Byte Address
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File Edit View Help

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    }
    //sort it
```

4

Memory

Identifier	Contents	Byte Address
...	...	...
tacos	NULL	28

More Memory

Identifier	Contents	Byte Address
...	...	...

File Edit View Help

Add Tacos Demo

4

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Memory

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More Memory

Identifier	Contents	Byte Address
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        {
            tacos[i] = aTaco;
            break;
        }
    }
    //sort it
```

4

Memory

Identifier	Contents	Byte Address
...	...	...
tacos	NULL	28
...	...	...
tacos[0]	NULL	64
tacos[1]	NULL	70
tacos[2]	NULL	76
tacos[3]	NULL	82
...	...	...

More Memory

Identifier	Contents	Byte Address
...	...	...

Add Tacos Demo

```
public void init(int size)
{
    if(size >= 1)
        tacos = new Taco[size];
    else
        tacos = new Taco[DEF_SIZE];
}
public void addTaco(Taco aTaco)
{
    //Check if taco array is full
    if(tacos[tacos.length-1] != null)
    {
        System.out.println("The taco database is full");
        return;
    }
    //Find the first empty space
    for(int i=0;i<tacos.length;i++)
    {
        if(tacos[i] == null)
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tacos[2]	NULL	76
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...	...	...

More Memory

Identifier	Contents	Byte Address
...	...	...

File Edit View Help

Add Tacos Demo

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...	...	...

More Memory

Identifier	Contents	Byte Address
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File Edit View Help

Add Tacos Demo

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More Memory

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More Memory

Identifier	Contents	Byte Address
…	…	…
aTaco	256	128
…	…	…
Taco		256
aTaco.name	“none”	
aTaco.location	“none”	
aTaco.price	0.0	

Add Tacos Demo

```
public void init(int size)
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More Memory

Identifier	Contents	Byte Address
…	…	…
aTaco	326	128
…	…	…
Taco		256
aTaco.name	“none”	
aTaco.location	“none”	
aTaco.price	0.0	
…	…	…
Taco		326
aTaco.name	“asdf”	
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aTaco.price	0.0	
…	…	…
Taco		326
aTaco.name	“asdf”	
…	…	…

Add Tacos Demo

```
public void init(int size)
{
    if(size >= 1)
        tacos = new Taco[size];
    else
        tacos = new Taco[DEF_SIZE];
}
public void addTaco(Taco aTaco)
{
    //Check if taco array is full
    if(tacos[tacos.length-1] != null)
    {
        System.out.println("The taco database is full");
        return;
    }
    //Find the first empty space
    for(int i=0;i<tacos.length;i++)
    {
        if(tacos[i] == null)
        {
            tacos[i] = aTaco;
            break;
        }
    }
    //sort it
```

4

Memory

Identifier	Contents	Byte Address
…	…	…
tacos	64	28
…	…	…
tacos[0]	**256**	64
tacos[1]	NULL	70
tacos[2]	NULL	76
tacos[3]	NULL	82
…	…	…
i	1	93

More Memory

Identifier	Contents	Byte Address
…	…	…
aTaco	326	128
…	…	…
Taco		256
aTaco.name	“none”	
aTaco.location	“none”	
aTaco.price	0.0	
…	…	…
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More Memory

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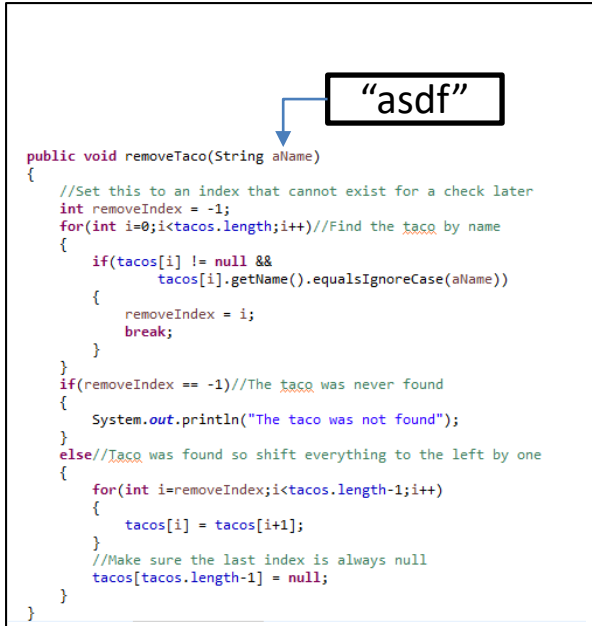
aTaco.price	0.0	
…	…	…
Taco		326
aTaco.name	“asdf”	
…	…	…

Remove Tacos Demo



Memory

Identifier	Contents	Byte Address
…	…	…
tacos	64	28
…	…	…
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More Memory

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aTaco.name	"none"	
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aTaco.price	0.0	
…	…	…
Taco		326
aTaco.name	"asdf"	
…	…	…

Remove Tacos Demo

"asdf"

```
public void removeTaco(String aName)
{
    //Set this to an index that cannot exist for a check later
    int removeIndex = -1;
    for(int i=0;i<tacos.length;i++)//Find the taco by name
    {
        if(tacos[i] != null &&
                tacos[i].getName().equalsIgnoreCase(aName))
        {
            removeIndex = i;
            break;
        }
    }
    if(removeIndex == -1)//The taco was never found
    {
        System.out.println("The taco was not found");
    }
    else//Taco was found so shift everything to the left by one
    {
        for(int i=removeIndex;i<tacos.length-1;i++)
        {
            tacos[i] = tacos[i+1];
        }
        //Make sure the last index is always null
        tacos[tacos.length-1] = null;
    }
}
```

Memory

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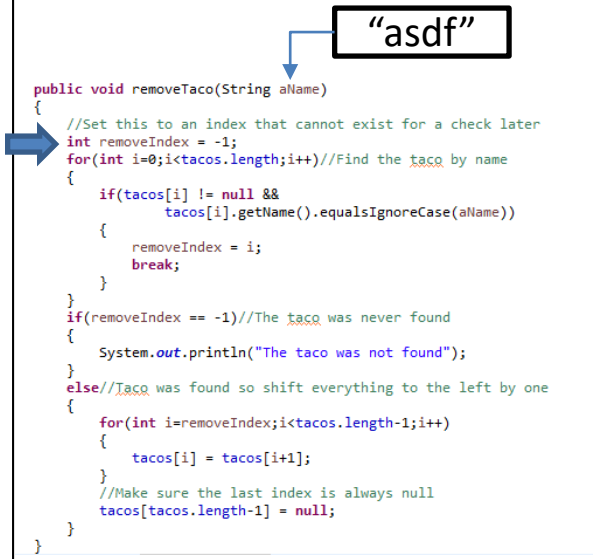
Remove Tacos Demo



Memory

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tacos	64	28
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…	…	…
removeIndex	-1	93

More Memory

Identifier	Contents	Byte Address
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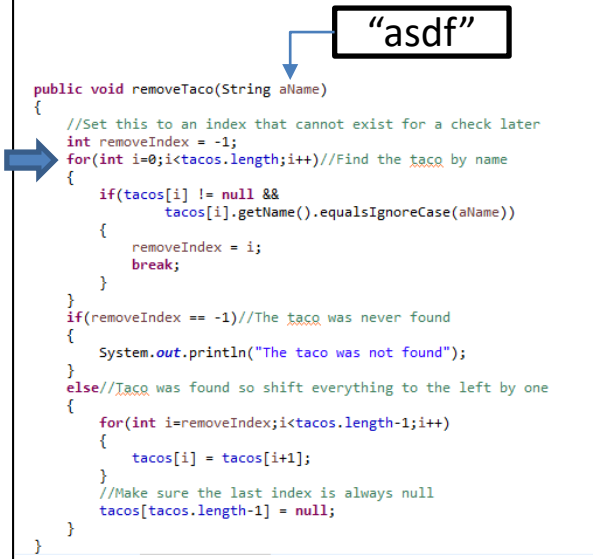
Remove Tacos Demo



Memory

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More Memory

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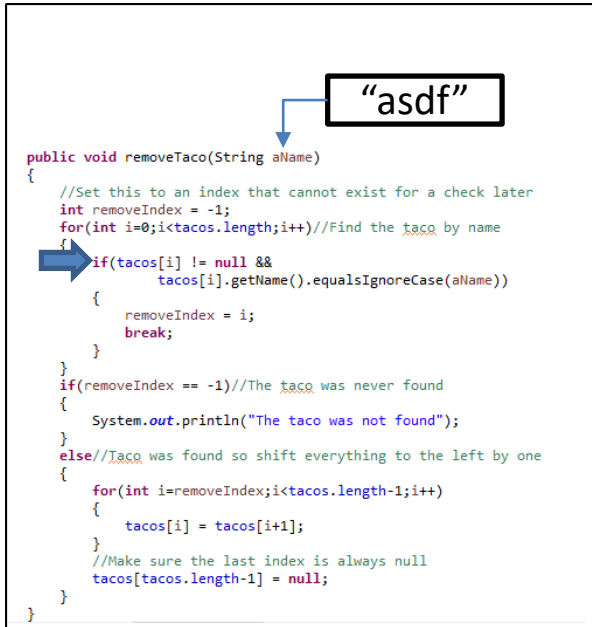
Remove Tacos Demo



Memory

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More Memory

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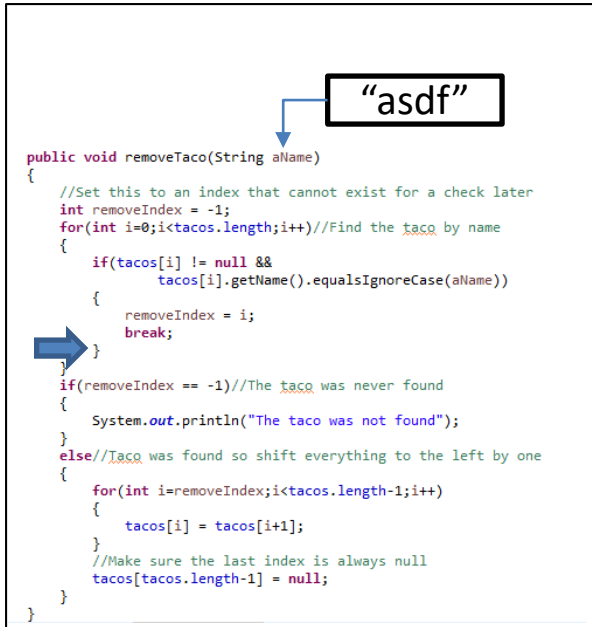
Remove Tacos Demo



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Remove Tacos Demo

"asdf"

```
public void removeTaco(String aName)
{
    //Set this to an index that cannot exist for a check later
    int removeIndex = -1;
    for(int i=0;i<tacos.length;i++)//Find the taco by name
    {
        if(tacos[i] != null &&
                tacos[i].getName().equalsIgnoreCase(aName))
        {
            removeIndex = i;
            break;
        }
    }
    if(removeIndex == -1)//The taco was never found
    {
        System.out.println("The taco was not found");
    }
    else//Taco was found so shift everything to the left by one
    {
        for(int i=removeIndex;i<tacos.length-1;i++)
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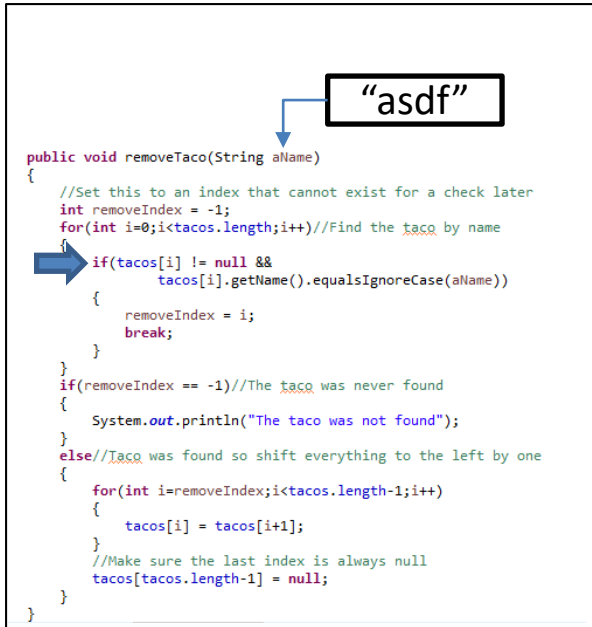

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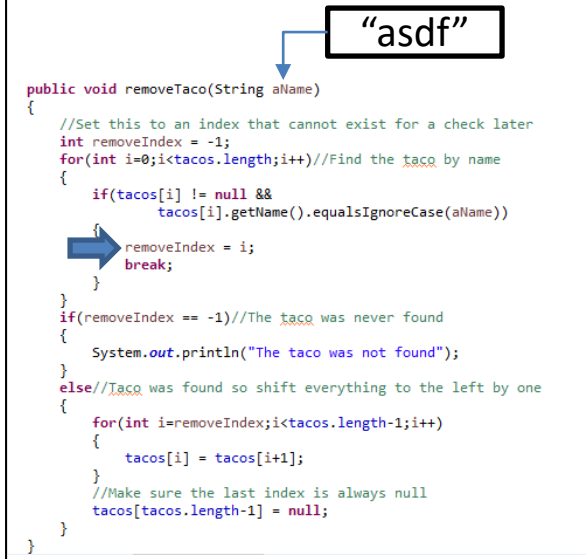

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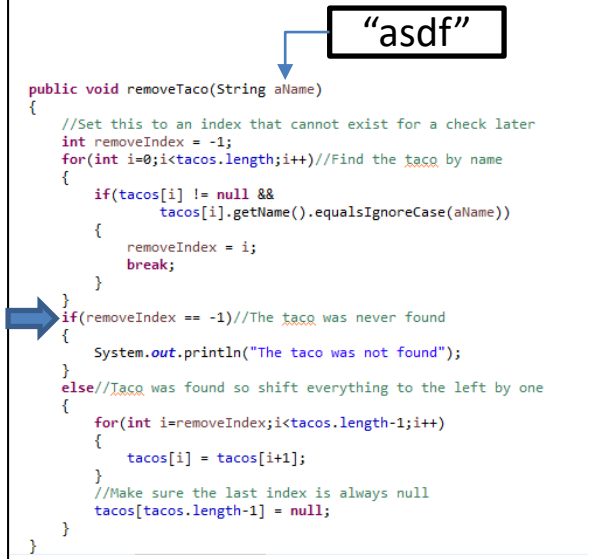

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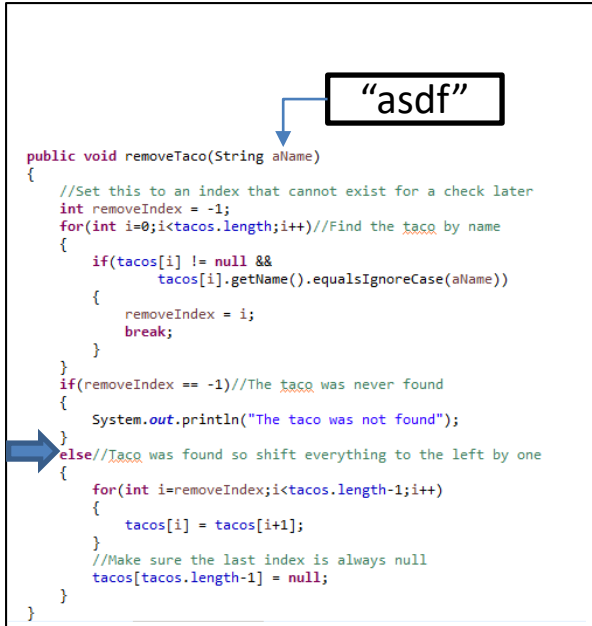

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        tacos[tacos.length-1] = null;
    }
}
```

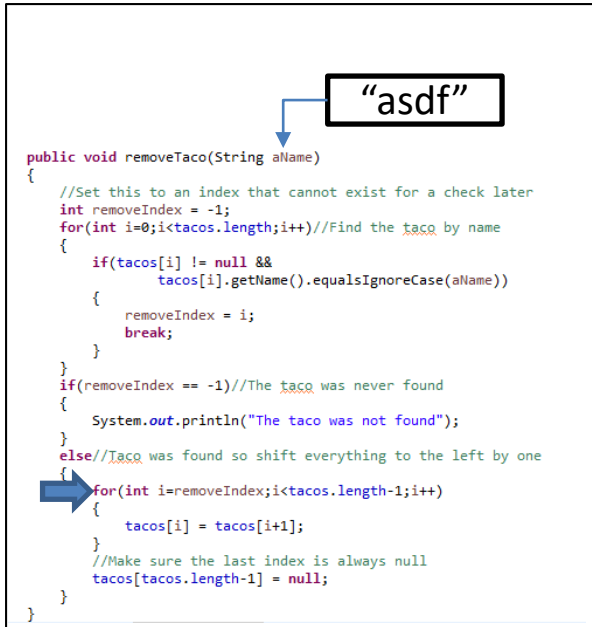
Memory

Identifier	Contents	Byte Address
…	…	…
tacos	64	28
…	…	…
tacos[0]	**256**	64
tacos[1]	**326**	70
tacos[2]	NULL	76
tacos[3]	NULL	82
…	…	…
removeIndex	1	93

More Memory

Identifier	Contents	Byte Address
…	…	…
aName	"asdf"	128
…	…	…
Taco		256
aTaco.name	"none"	
aTaco.location	"none"	
aTaco.price	0.0	
…	…	…
Taco		326
aTaco.name	"asdf"	
…	…	…

Remove Tacos Demo



Memory

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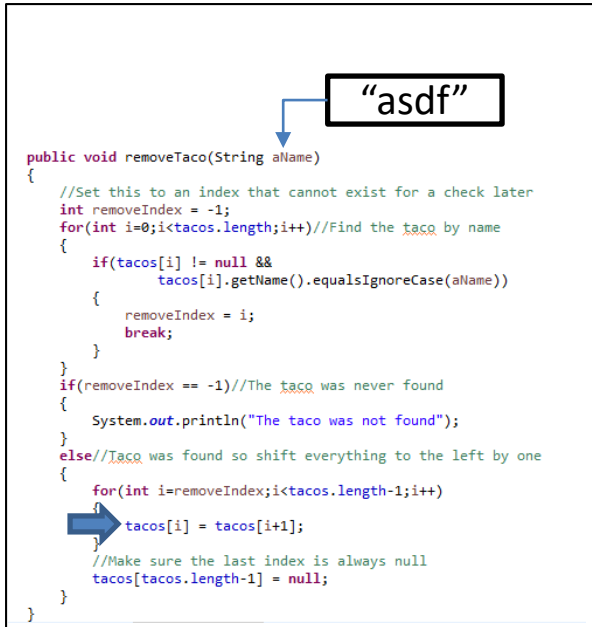
Remove Tacos Demo



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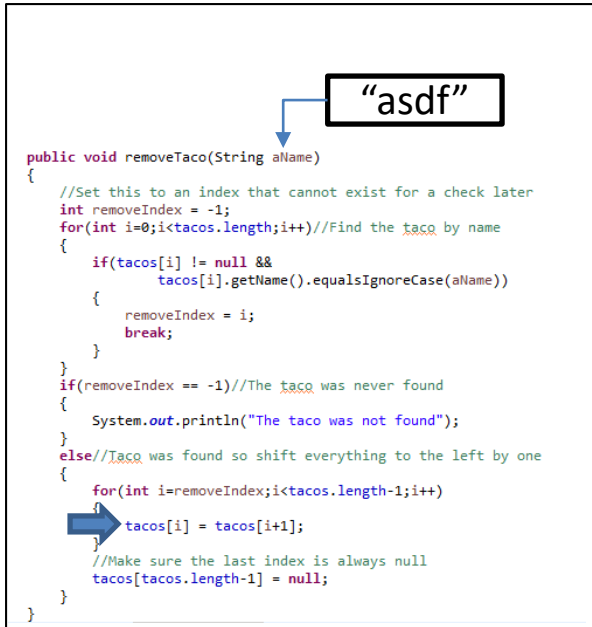
Remove Tacos Demo



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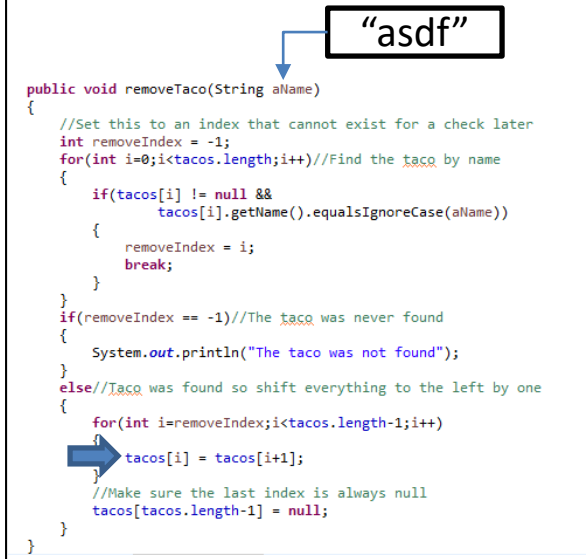

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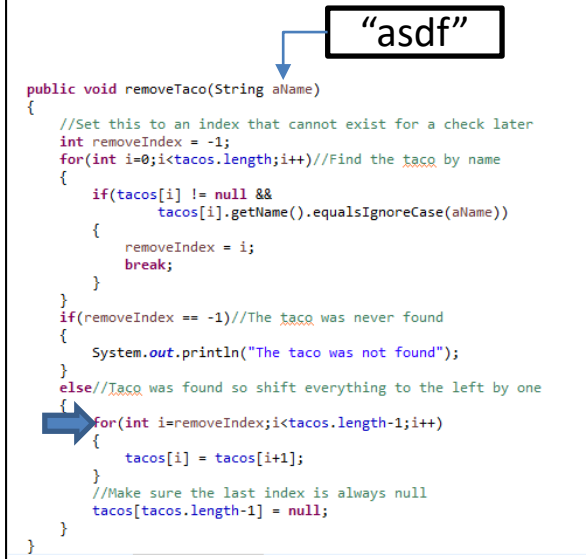
Remove Tacos Demo



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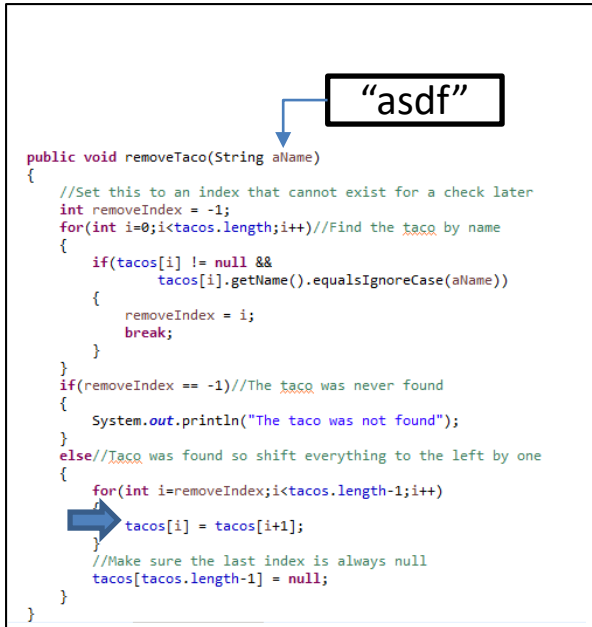
Remove Tacos Demo



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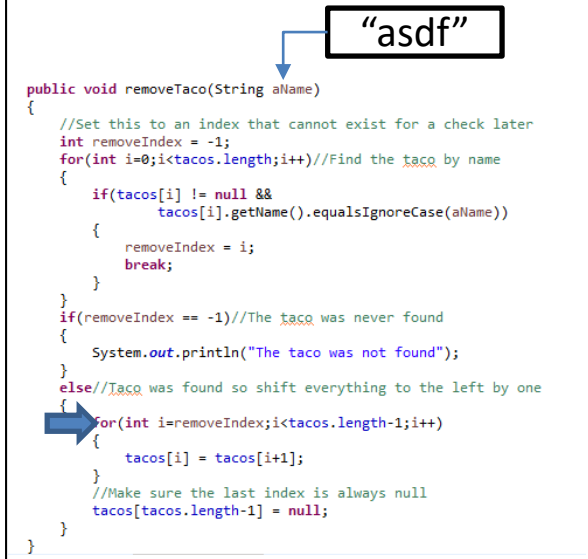

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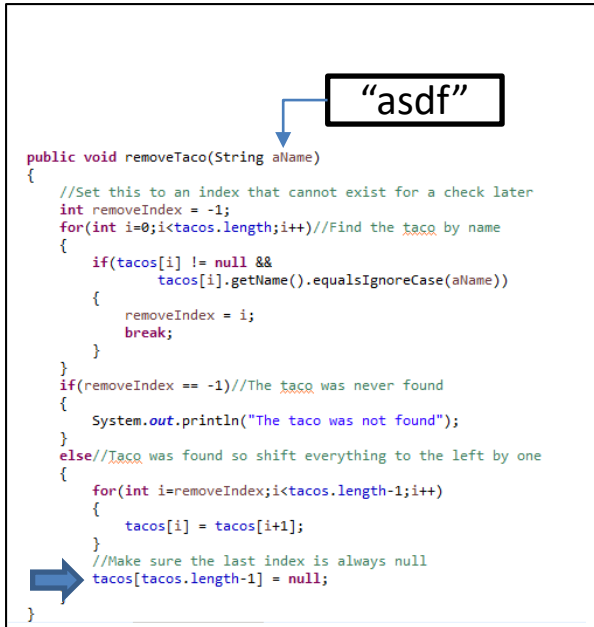

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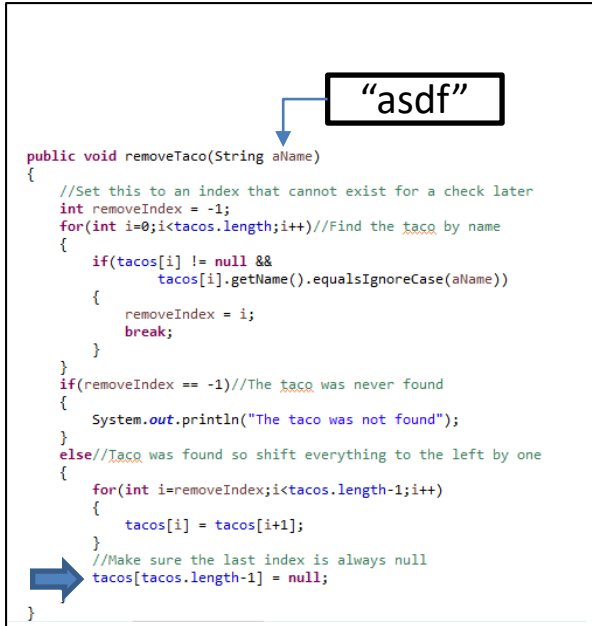
Remove Tacos Demo



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aTaco.name	"asdf"	
…	…	…

Remove Tacos Demo

"asdf"

```
public void removeTaco(String aName)
{
    //Set this to an index that cannot exist for a check later
    int removeIndex = -1;
    for(int i=0;i<tacos.length;i++)//Find the taco by name
    {
        if(tacos[i] != null &&
                tacos[i].getName().equalsIgnoreCase(aName))
        {
            removeIndex = i;
            break;
        }
    }
    if(removeIndex == -1)//The taco was never found
    {
        System.out.println("The taco was not found");
    }
    else//Taco was found so shift everything to the left by one
    {
        for(int i=removeIndex;i<tacos.length-1;i++)
        {
            tacos[i] = tacos[i+1];
        }
        //Make sure the last index is always null
        tacos[tacos.length-1] = null;
    }
}
```

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aTaco.name	"none"	
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aTaco.price	0.0	
…	…	…

Split for Strings

- The “split” method separates a String into an Array of Strings given delimiters
  - Start of String to first delimiter = Index 0
  - After the first delimiter to the next one = Index 1
  - After the second delimiter to the next one = Index 2
  - …
  - After the last delimiter to the end of the String = Last Index
- Uses a Regular Expression (REGEX)

Example

```
//Assume str = “name1\tlocation1\t1.0\n”
String[] splitStr = str.split(“\t”);
```

Array

splitStr =

Split for Strings

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Index	0	1	2
Value			

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//Assume str = “name1\tlocation1\t1.0\n”
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```

Array

splitStr =

Index	0	1	2
Value	“name1”		

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```

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```

Array

splitStr =

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Value	“name1”	“location1”	“1.0”