Week 7: For Loops

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10/12/2021

Berkeley
UNIVERSITY OF CALIFORNIA

What is a loop? What is a for loop?

Loop - the action of doing something over and over again

For Loop - type of loop that have a pre-specified beginning and end; used when you want to repeat an action a certain number of times

Examples:

- "Set the table for 4 people"
- "Make 10 burritos"
- Chicken dance!

Example: Imagine you’re giving instructions to someone who has never set a table before for 4

Do this 4 times:

- Put out placemat
- Put out plate
- Put out napkin
- Place fork on napkin on left side
- Place knife then spoon on right side of the plate
- Put glass on right side of placemat

Another example

I’m having a Halloween party. I need to make a guest list and send text messages to everyone to invite them.

I could do a group text, but I figured it would be more personal to send individual messages.

```
guest_list = Willa, Roya, Elena, Emily, Smriti
```

That’s it for now. I can always add more people later. (Plus, gotta check the covid protocols…)

```
guest_list = Willa, Roya, Elena, Emily, Smriti
```

Now that I have my list, I’m going to write my message:

```
message = “I’m having a Halloween Party on 10/31! The party starts at
9pm. I hope to see you there!”
```

Sweet! Now that I have my guest list and message, I’m ready to start sending text invites **to each person on the guest list**.

```
To Willa: send(message)
To Roya: send(message)
To Elena: send(message)
... etc.
```

```
For each person on the guest list:
    send(message)
```

Goal:

sent

To: **345-943-0876**,
Hi **Willa**! I'm having a Halloween Party on 10/31! The party starts at 9pm. I hope to see you there!

To: **206-738-9942**,
Hi **Elena**! I'm having a Halloween Party on 10/31! The party starts at 9pm. I hope to see you there!

To: **548-224-0381**,
Hi **Roya**! I'm having a Halloween Party on 10/31! The party starts at 9pm. I hope to see you there!

Anatomy of a for loop

```
for (i in “some range”){

“do something”

}
```

Anatomy of a for loop

index/iterator.
Exists in the scope of
the loop

```
for (i in “some range”){

“do something”

}
```

Anatomy of a for loop

What are you iterating over?

- A list of participants?
- A range of numbers?

```
for (i in “some range”){

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Anatomy of a for loop

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for (i in "some range"){

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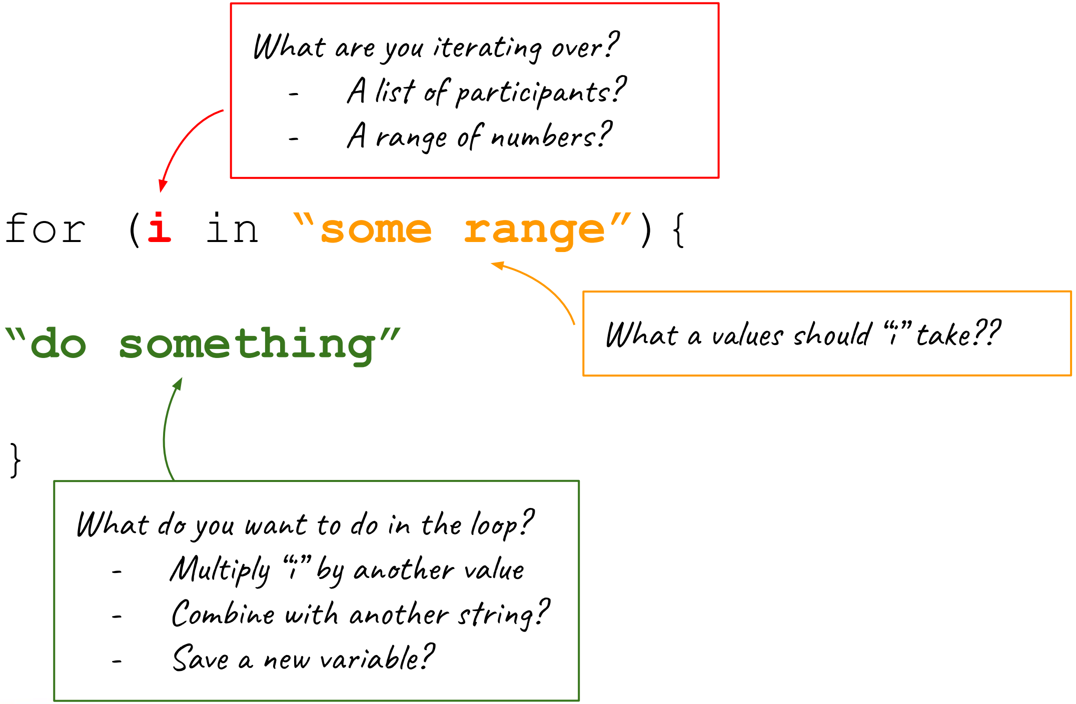
What a values should "i" take??

Anatomy of a for loop



What are you iterating over?

- A list of participants?
- A range of numbers?

```
for (i in “some range”){

“do something”

}
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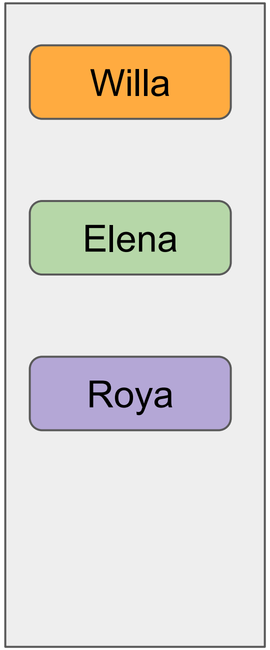
What a values should “i” take??

What do you want to do in the loop?

- Multiply “i” by another value
- Combine with another string?
- Save a new variable?

The logic of for loops



Willa

Elena

Roya

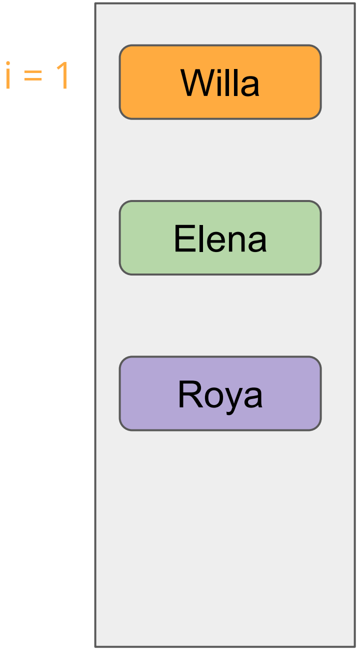
length(guest_list) = 3, so loop stops at i = 3

```
for (i in 1:length(guest_list)) {

print(guest_list[i])

}
```

The logic of for loops

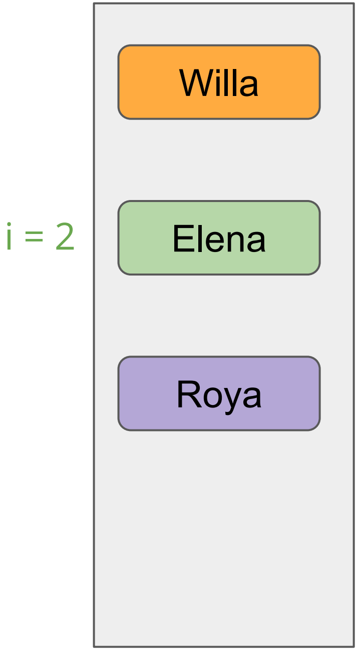


```
for (i in 1:length(guest_list)) {

print(guest_list[i])

}
```

The logic of for loops



i = 2

Willa

Elena

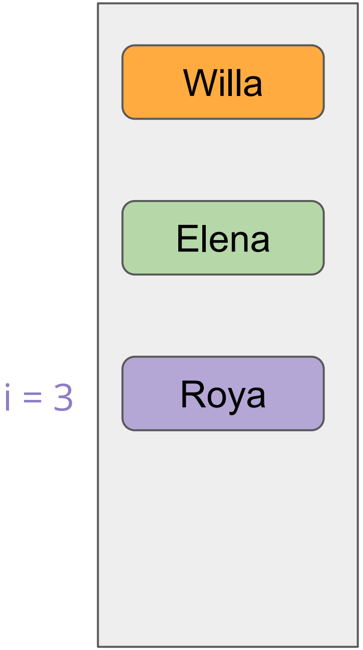
Roya

```
for (i in 1:length(guest_list)) {

print(guest_list[i])

}
```

The logic of for loops



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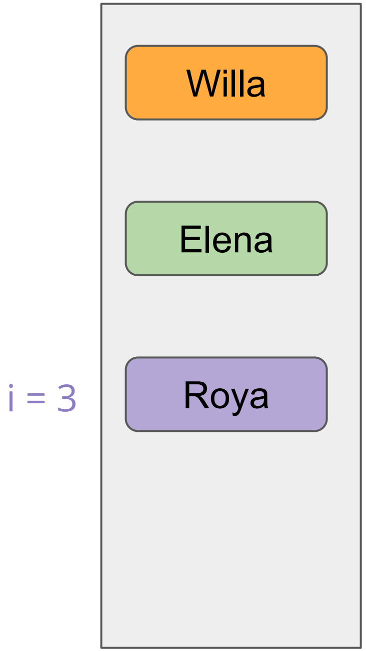
print(guest_list[i])

}
```

The logic of for loops



Iterating over a range of integers

```
for (i in 1:length(guest_list)) {

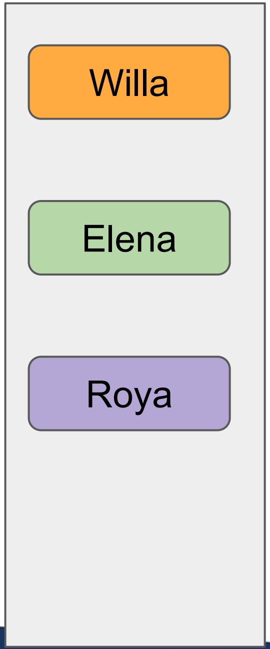
print(guest_list[i])

}
```

i takes on values 1:3

Print the guest for each value of i.

We can do more than just accessing values in a vector



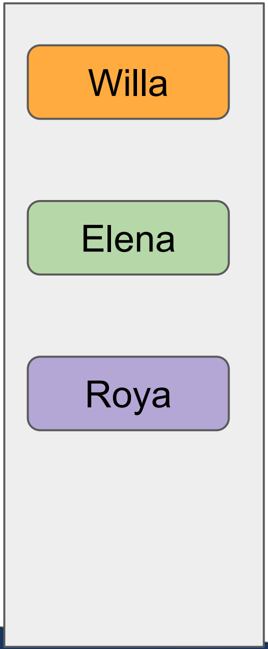
```
message <- “I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!”

for (i in 1:length(guest_list)) {

print(message)

}
```

We can do more interesting things in the body of our for loop.



Willa

Elena

Roya

```
message = “I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!”

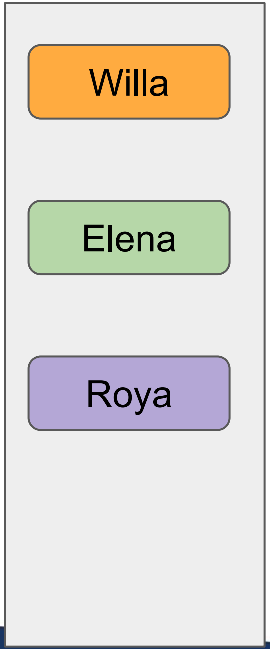
for (i in 1:length(guest_list)) (

print(message)

)
```

What will the output be?

Let’s use this idea to write a personalized message



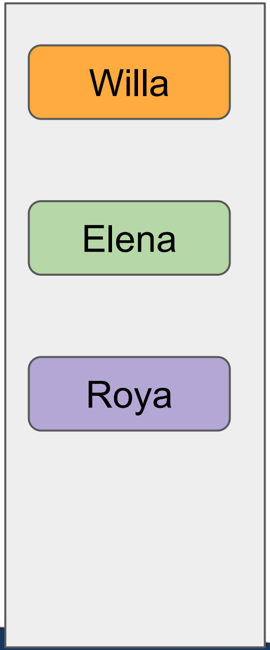
Willa

Elena

Roya

```
Print a message that says “hi <guest name>.
“I’m having a Halloween Party on 10/31! The party
starts at 9pm. I hope to see you there!”
```

Let’s use this idea to write a personalized message



Willa

Elena

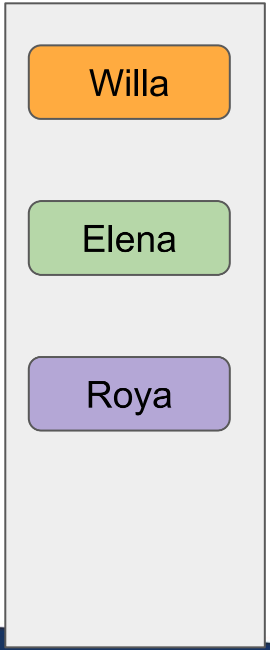
Roya

```
Print a message that says “hi <guest name>.
“I’m having a Halloween Party on 10/31! The party
starts at 9pm. I hope to see you there!”
```

What needs to change each time?

What stays the same?

Let’s use this idea to write a personalized message



Willa

Elena

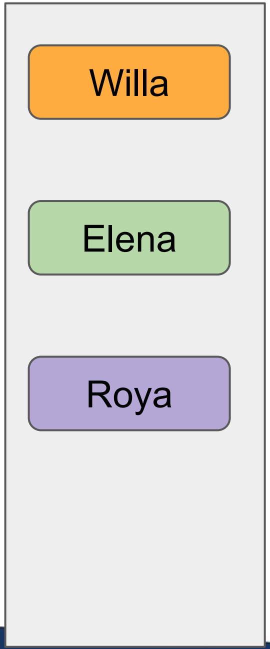
Roya

iterate over guest list

```
Print a message that says “hi  <guest name>. “I’m
having a Halloween Party on 10/31! The party starts
at 9pm. I hope to see you there!”
```

The message stays the same

We can use indexing to personalize the message



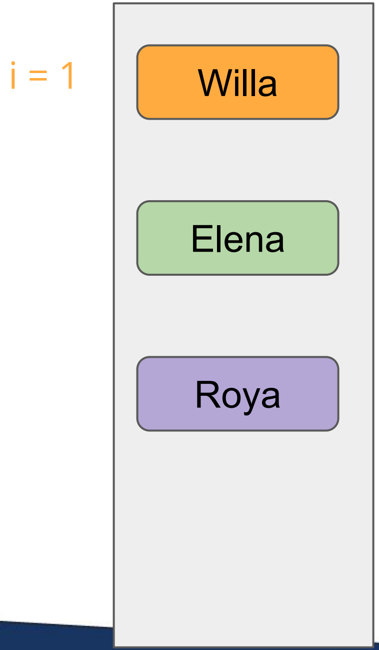
```
message = “I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!”

for (i in 1:length(guest_list)) {

print(paste0(“hi”, guest_list[ i}, message”)

}
```

We can use indexing to personalize the message



i = 1

Willa

Elena

Roya

```
message = “I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!”

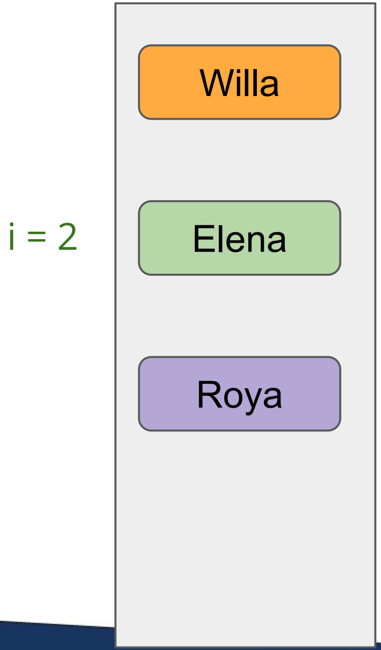
for (i in 1:length(guest_list)) {

print(paste0(“hi”, guest_list[ i}, message”)

}
```

Hi **Willa**! I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

We can use indexing to personalize the message



i = 2

Willa

Elena

Roya

```
message = “I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!”

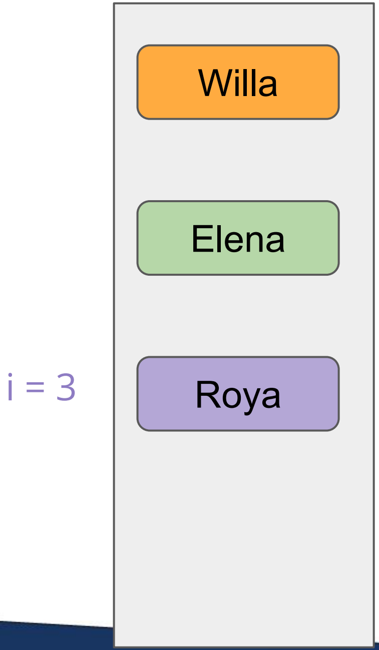
for (i in 1:length(guest_list)) {

print(paste0(“hi”, guest_list[ i}, message”)

}
```

Hi **Elena**! I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

We can use indexing to personalize the message



```
message = “I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!”

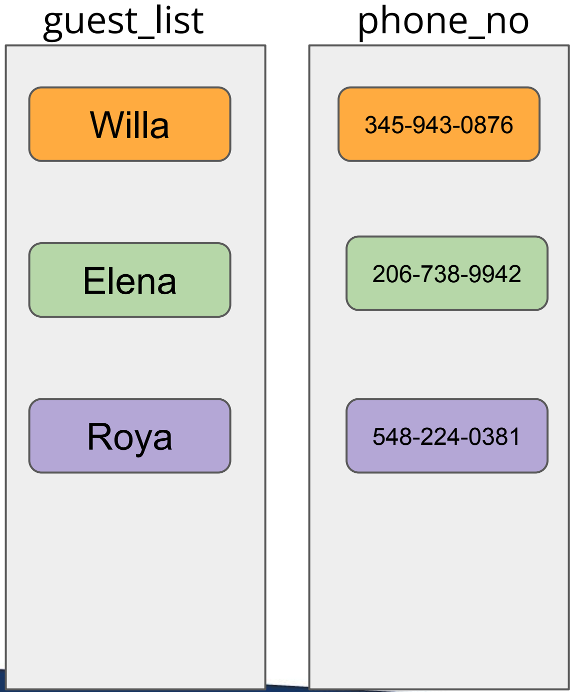
for (i in 1:length(guest_list)) {

print(paste0(“hi”, guest_list[ i}, message”)

}
```

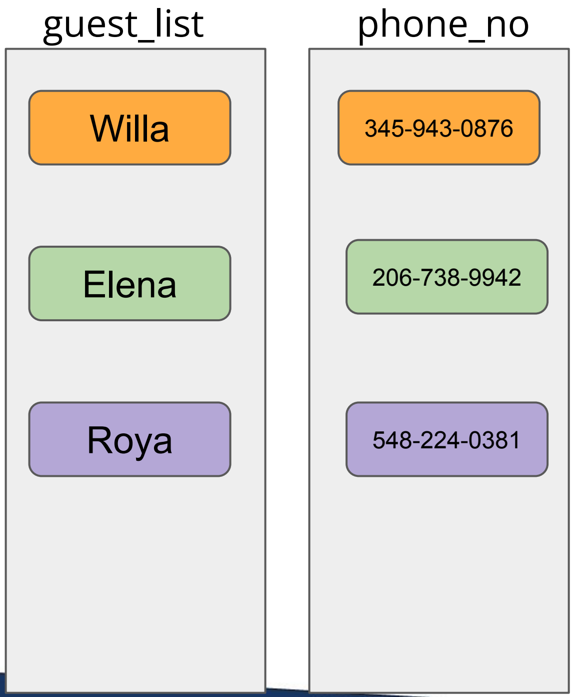
Hi **Roya**! I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

The concept of indexing allows us to include information from more vectors



guest_list	phone_no
Willa	345-943-0876
Elena	206-738-9942
Roya	548-224-0381

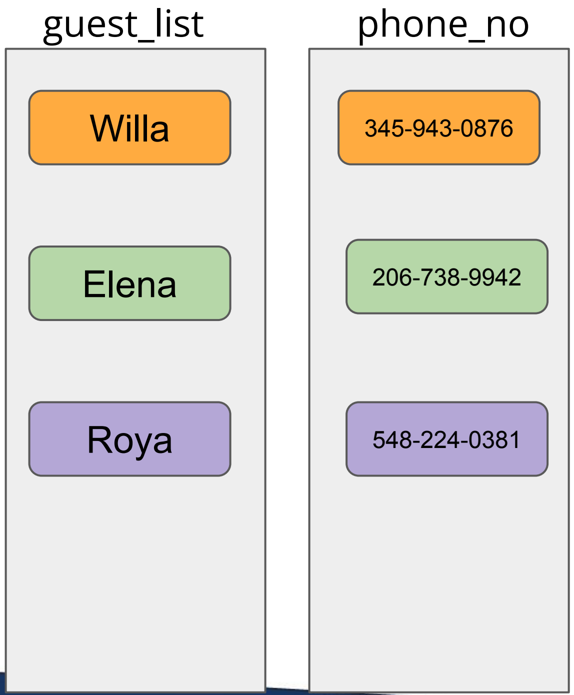
The concept of indexing allows us to include information from more vectors



guest_list	phone_no
Willa	345-943-0876
Elena	206-738-9942
Roya	548-224-0381

To: **345-943-0876**,
Hi **Willa**! I'm having a Halloween Party on 10/31! The party starts at 9pm. I hope to see you there!

The context of indexing allows us to include information from more vectors



guest_list	phone_no
Willa	345-943-0876
Elena	206-738-9942
Roya	548-224-0381

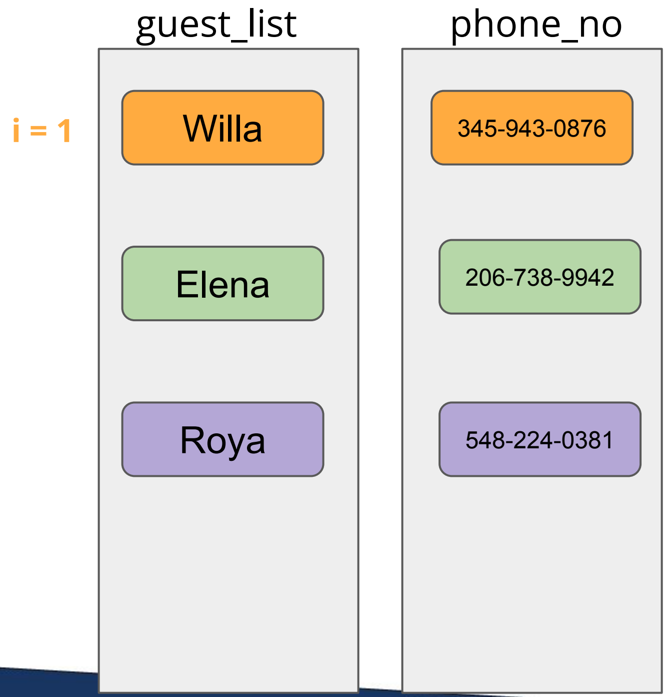
```
for (i in 1:3) {

print(paste0(“To:”, phone_no[ i],

“hi”, guest_list[ i}, message”)

}
```

The concept of indexing allows us to include information from more vectors



	guest_list	phone_no
i = 1	Willa	345-943-0876
	Elena	206-738-9942
	Roya	548-224-0381

```
for (i in 1:3) {

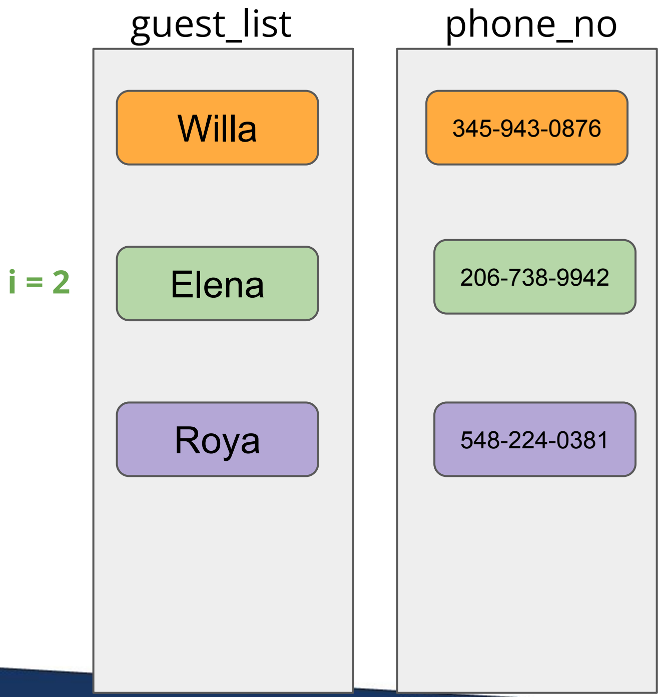
print(paste0(“To:”, phone_no[ i],

“hi”, guest_list[ i}, message”)

}
```

To: **345-943-0876**,
Hi **Willa**! I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

The concept of indexing allows us to include information from more vectors



```
for (i in 1:3) {

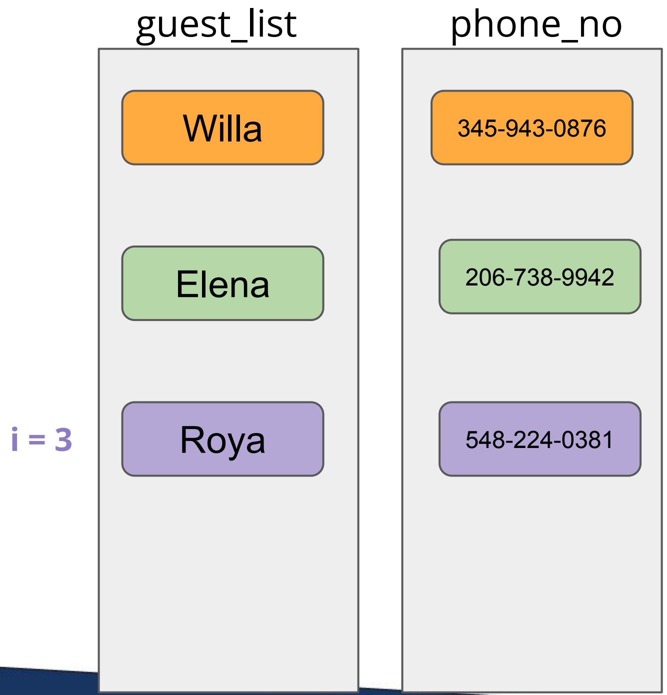
print(paste0(“To:”, phone_no[ i],

“hi”, guest_list[ i}, message”)

}
```

To: **206-738-9942**,
Hi **Elena**! I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

The concept of indexing allows us to include information from more vectors



```
for (i in 1:3) {

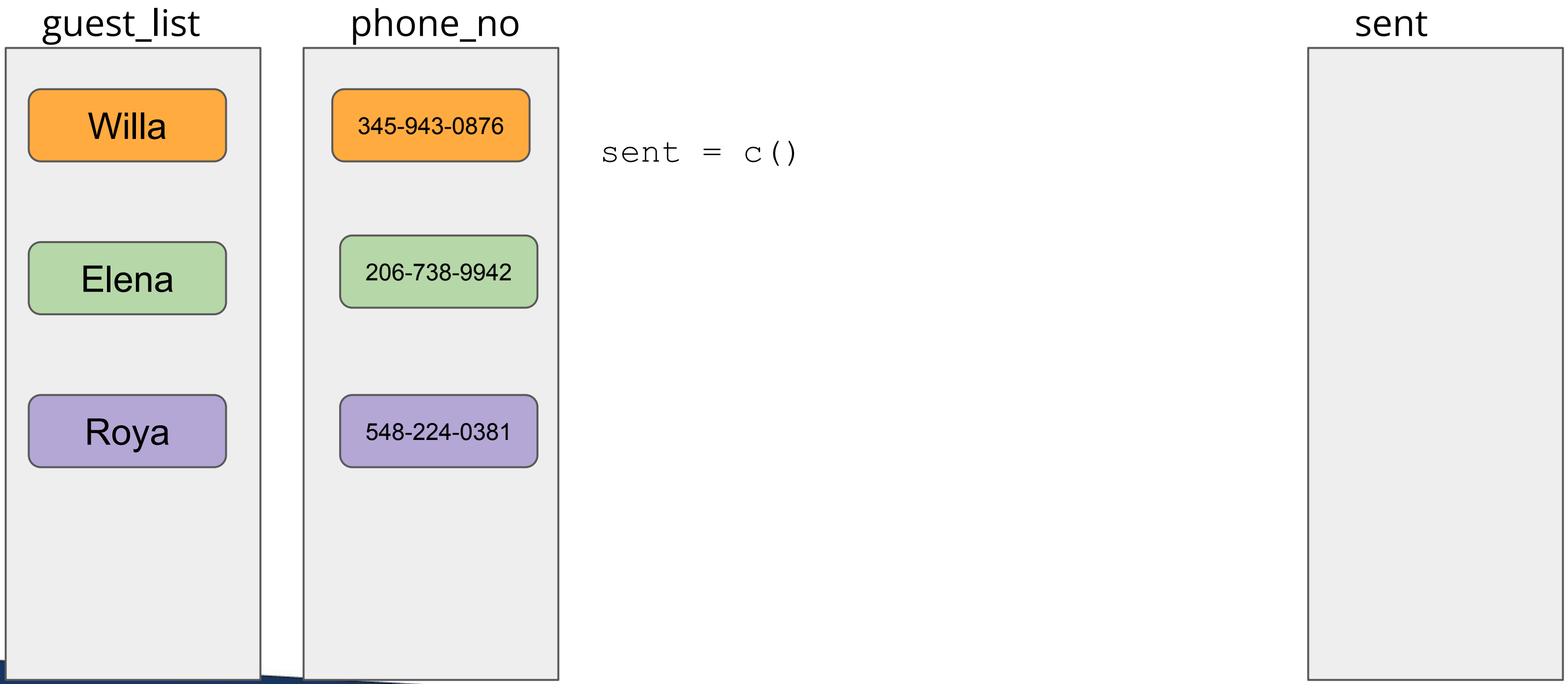
print(paste0(“To:”, phone_no[ i],

“hi”, guest_list[ i}, message”)

}
```

To: **548-224-0381**,
Hi **Roya**! I’m having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

We can also use indexing to save the output to a new vector



guest_list

Willa

Elena

Roya

phone_no

345-943-0876

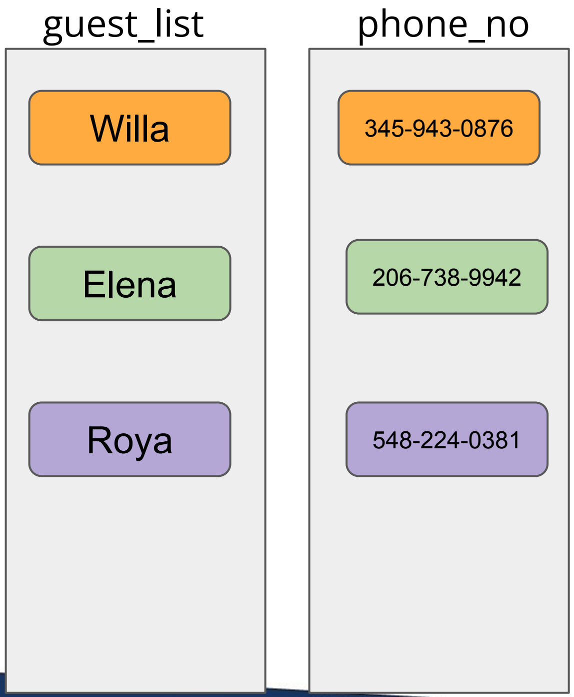
206-738-9942

548-224-0381

```
sent = c()
```

sent

We can also use indexing to save the output to a new vector



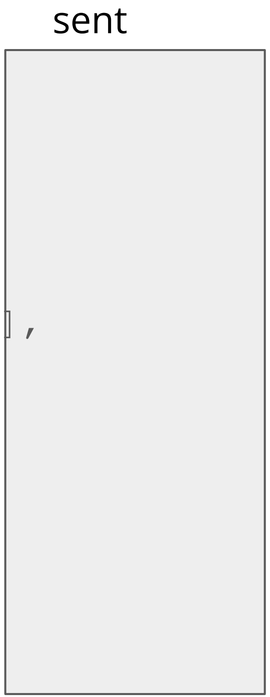
```
sent = c()

for (i in 1:3) {

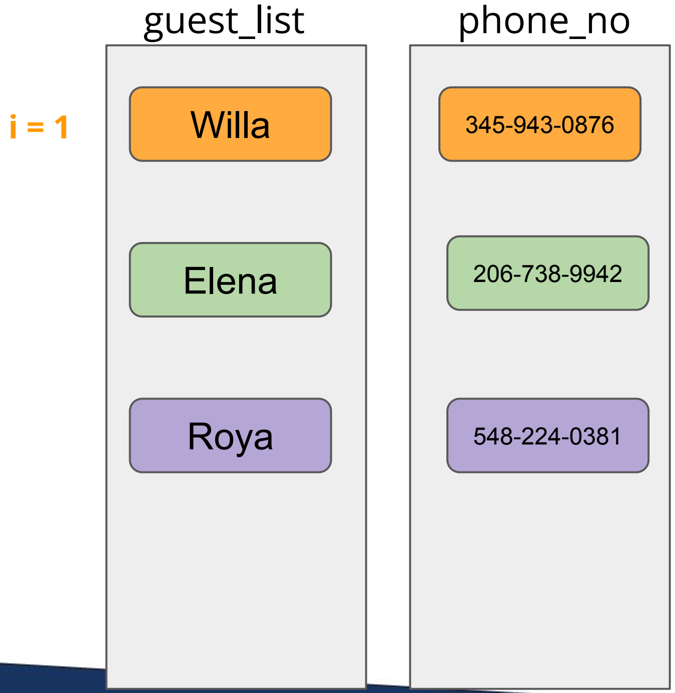
sent[i] = (paste0(“To:”, phone_no[ i],

“hi”, guest_list[ i}, message”)

}
```



We can also use indexing to save the output to a new vector



i = 1

guest_list

Willa

Elena

Roya

phone_no

345-943-0876

206-738-9942

548-224-0381

```
sent = c()

for (i in 1:3) {

sent[i] = (paste0(“To:”, phone_no[ i],

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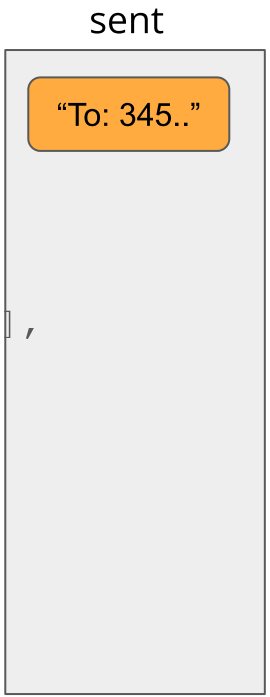
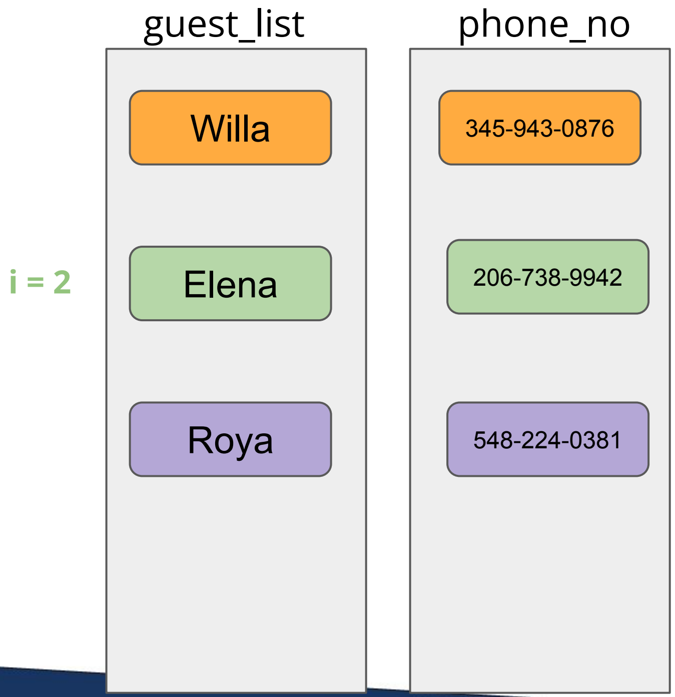
}
```



sent

“To: 345..”

We can also use indexing to save the output to a new vector



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```

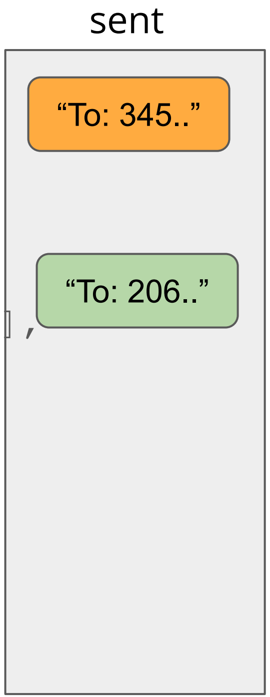

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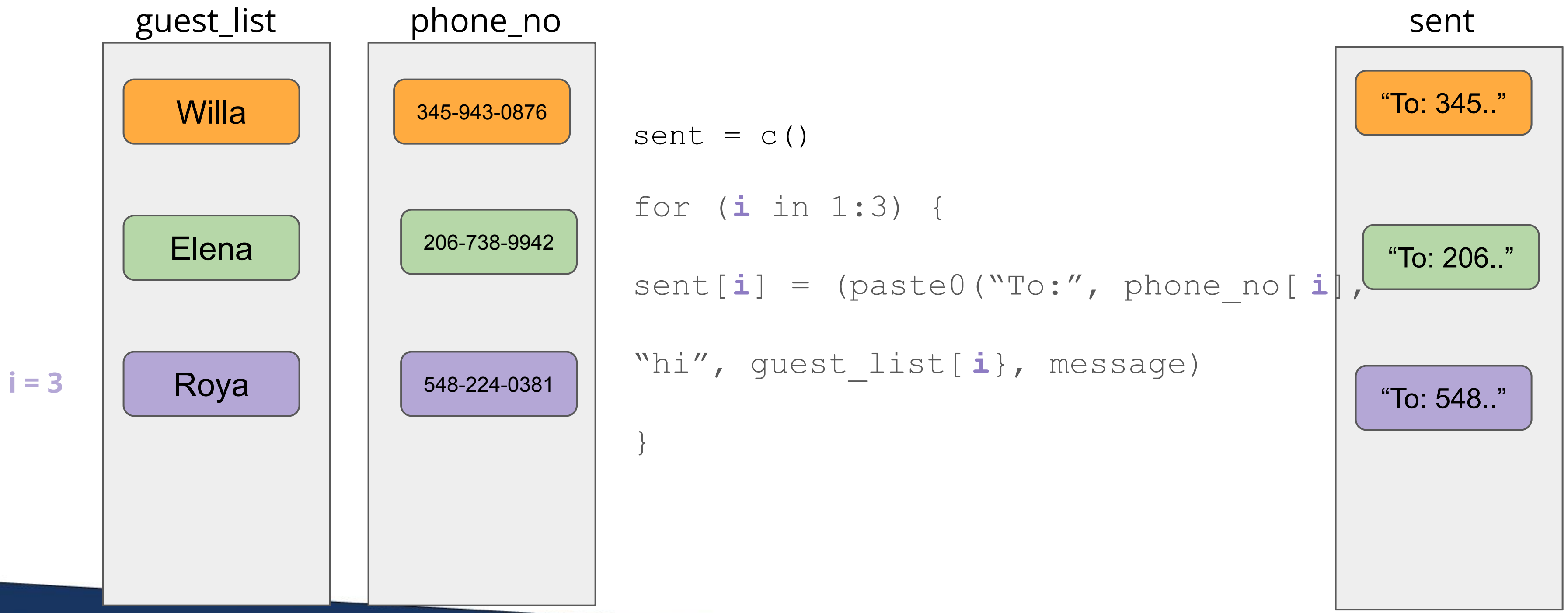

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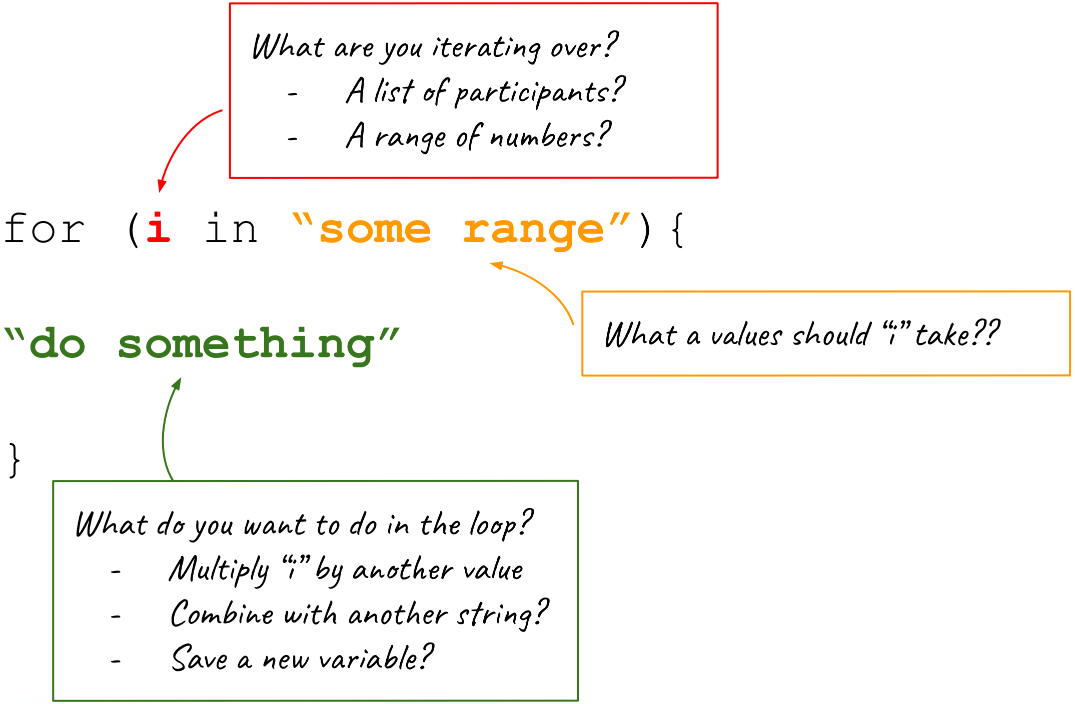


```
for (i in "some range"){

"do something"

}
```

What are you iterating over?

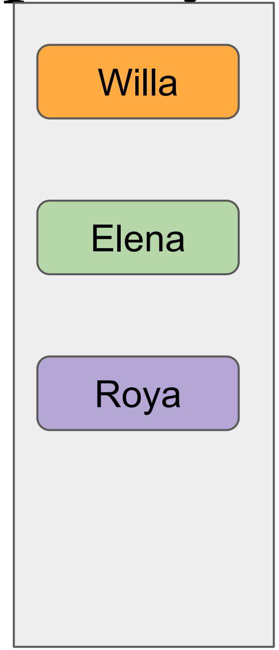
- A list of participants?
- A range of numbers?

What a values should "i" take??

What do you want to do in the loop?

- Multiply "i" by another value
- Combine with another string?
- Save a new variable?

When we only have one vector we can use an even simpler syntax

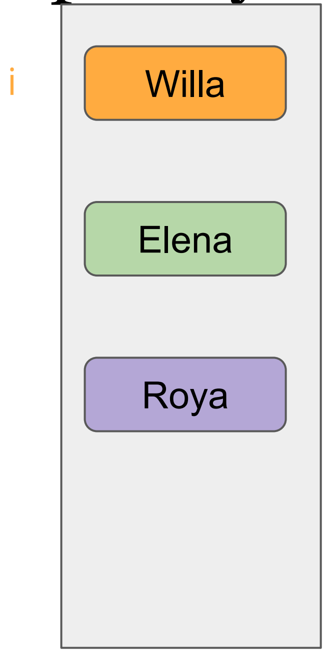


```
for (i in guest_list) (

print(i)

)
```

When we only have one vector we can use an even simpler syntax



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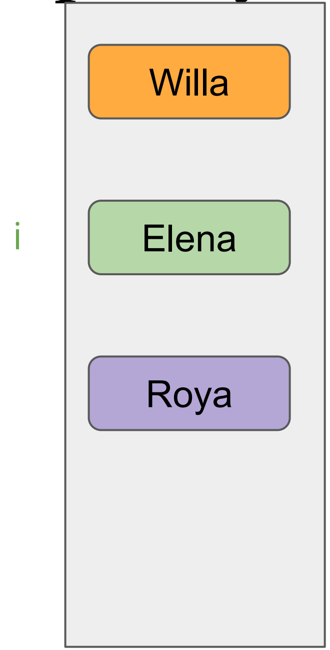

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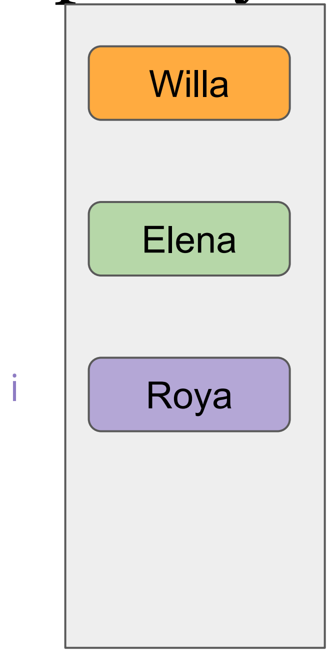


Willa

Elena

i

Roya

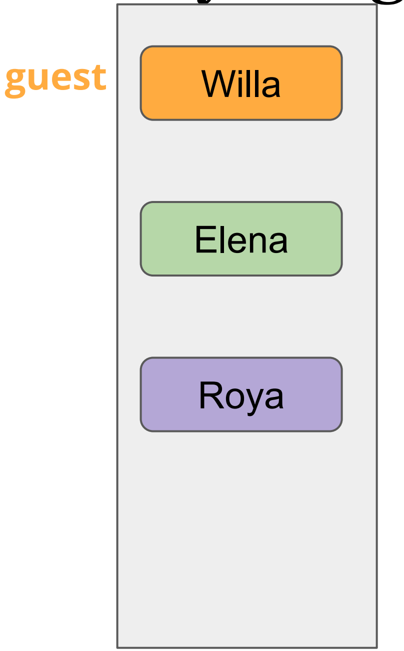
```
for (i in guest_list) (

print(i)

)
```

“ i “ is the standard we use for indexing but you can use anything that makes sense to you.

“ i “ is the standard we use for indexing but you can use anything that makes sense to you.



guest

Willa

Elena

Roya

```
for (guest in guest_list) (

print(guest)

)
```