Sets and Dictionaries

Examples

How early was each kind of bird seen?

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2010-07-03    06:02    goose
2010-07-03    06:07    loon
2010-07-04    05:09    ostrich   # hallucinating?
2010-07-04    05:29    loon
     ⋮          ⋮       ⋮
```

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Use bird name as dictionary key

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Want the minimum of all times associated with a bird

Use bird name as dictionary key

And earliest observation time as value

```
def read_observations(filename):
  '''Read data, return [(date, time, bird)...].'''

  reader = open(filename, 'r')
  result = []

  for line in reader:
    fields = line.split('#')[0].strip().split()
    assert len(fields) == 3, 'Bad line "%s"' % line
    result.append(fields)

return result
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Get data from each line of the file

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```

Check that the data might be right

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```

Store it

```
def earliest_observation(data):
  '''How early did we see each bird?'''

  result = {}
  for (date, time, bird) in data:
    if bird not in result:
      result[bird] = time
    else:
      result[bird] = min(result[bird], time)

return result
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Process each tuple in turn

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First sighting, so this must be earliest time

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  for (date, time, bird) in data:
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Subsequent sighting, so take minimum

What birds were seen on each day?

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Very similar structure...

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Very similar structure...

...but use a set to record one or more birds,

rather than taking the minimum time

```
def birds_by_date(data):
  '''Which birds were seen on each day?'''

  result = {}
  for (date, time, bird) in data:
    if date not in result:
      result[date] = set()
    result[date].add(bird)

return result
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Make sure there is space to record this bird

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return result
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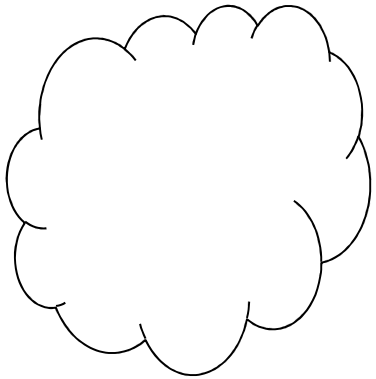
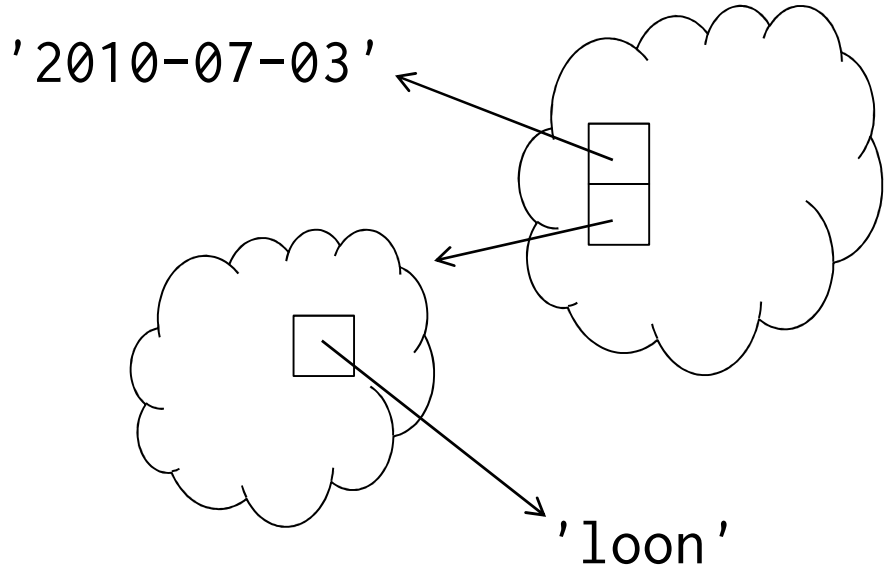
Record this bird



```
2010-07-03    05:38    loon
```



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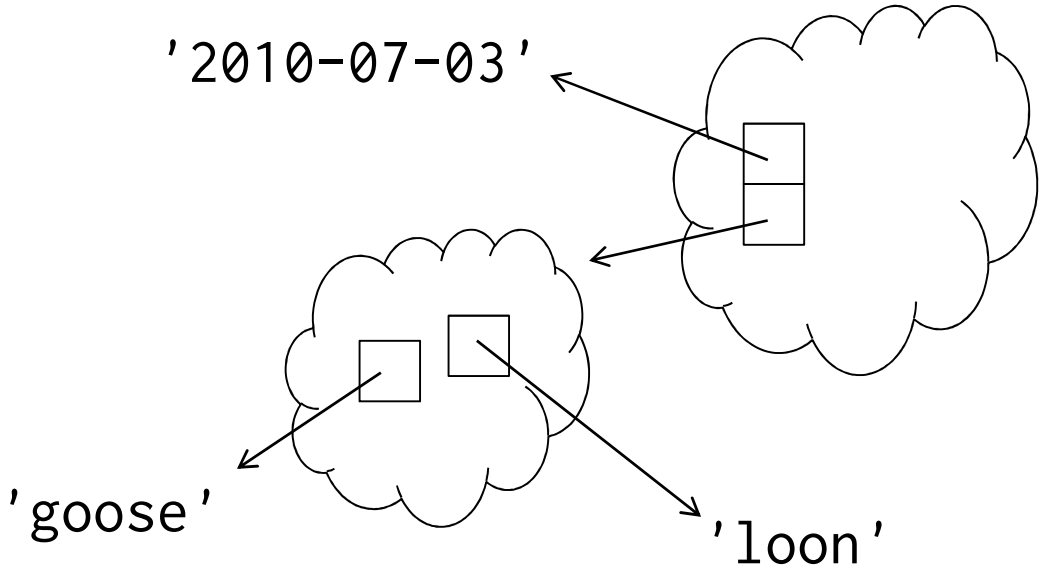

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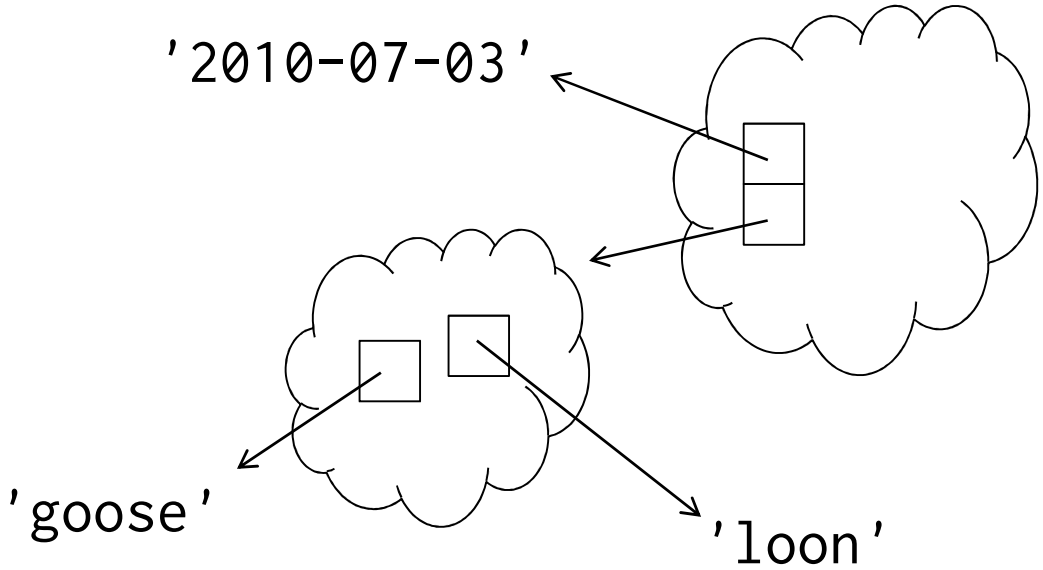

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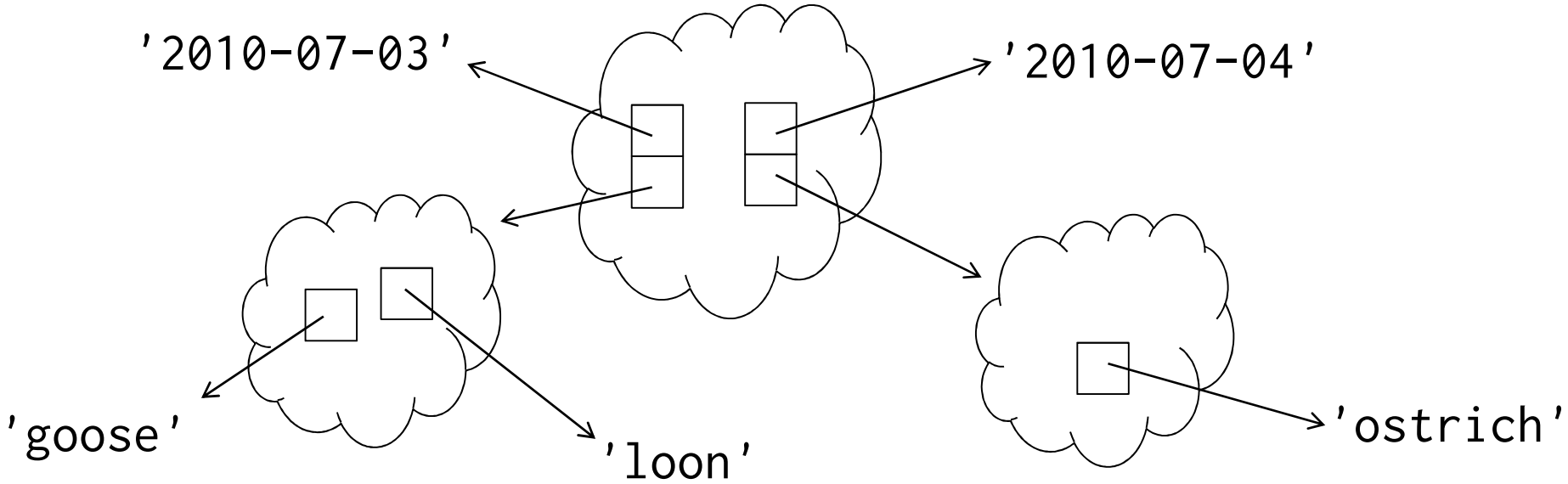

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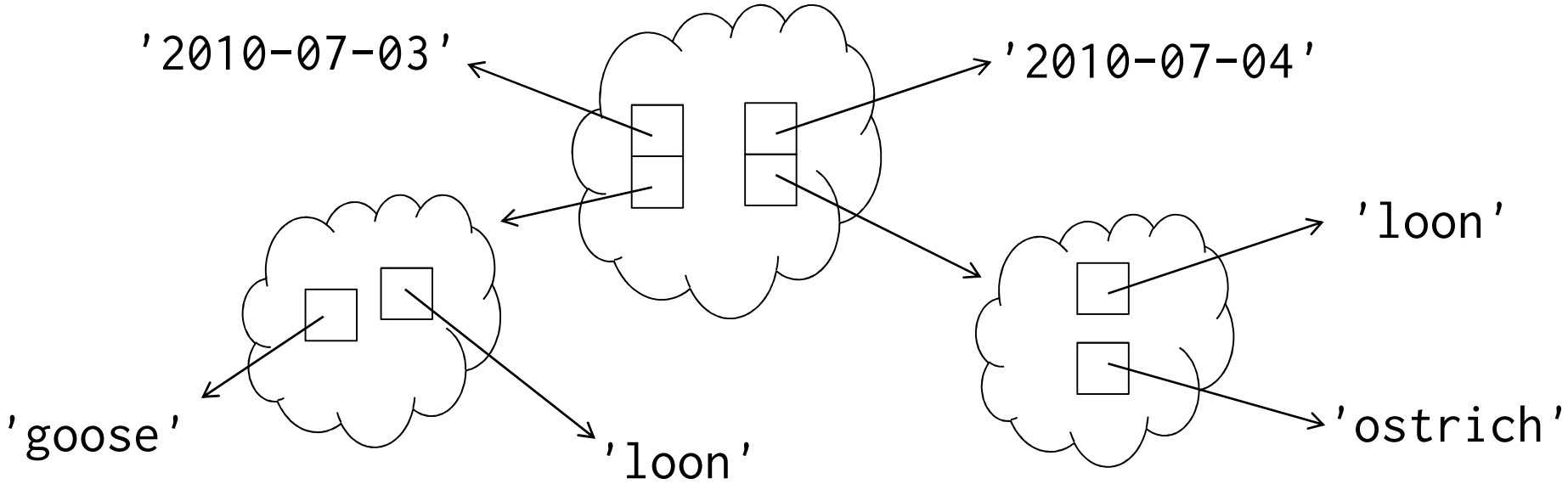

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Combine these calculations in a one-pass algorithm

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Two-pass algorithm

- Find the minimum value in the dictionary
- Find all keys with that value

Combine these calculations in a one-pass algorithm

Assume we already have a dictionary `counts` recording how often each kind of bird was seen

```
def least_frequently_seen(counts):
  '''Which bird(s) were least frequently seen?'''

  result = set()
  number = 0
  for bird in counts:
    …handle this bird…

  return result
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```

```
if len(result) == 0:
  result = {bird}
  number = counts[bird]
elif counts[bird] < number:
  result = {bird}
  number = counts[bird]
elif counts[bird] == number:
  result.add(bird)
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Case 1: first bird (initializing data structures)

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Case 2: new minimum, so replace everything

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Case 3: tied equal for minimum

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{ 'loon' : 3, 'goose' : 1, 'ostrich' : 1 }
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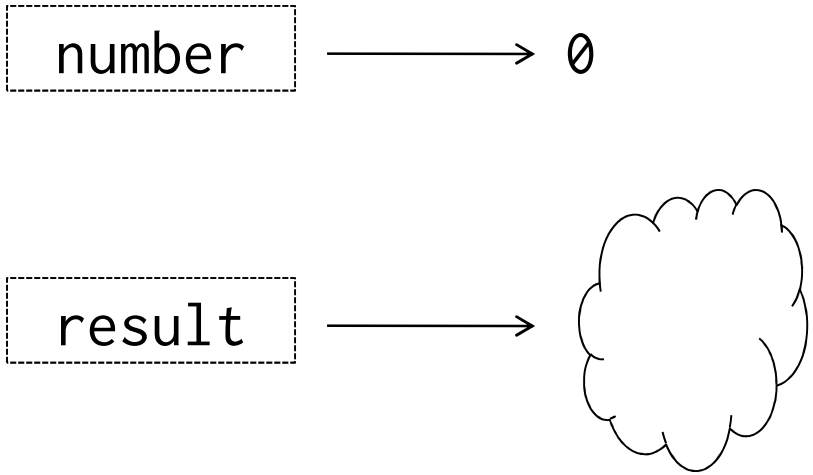

Before the loop

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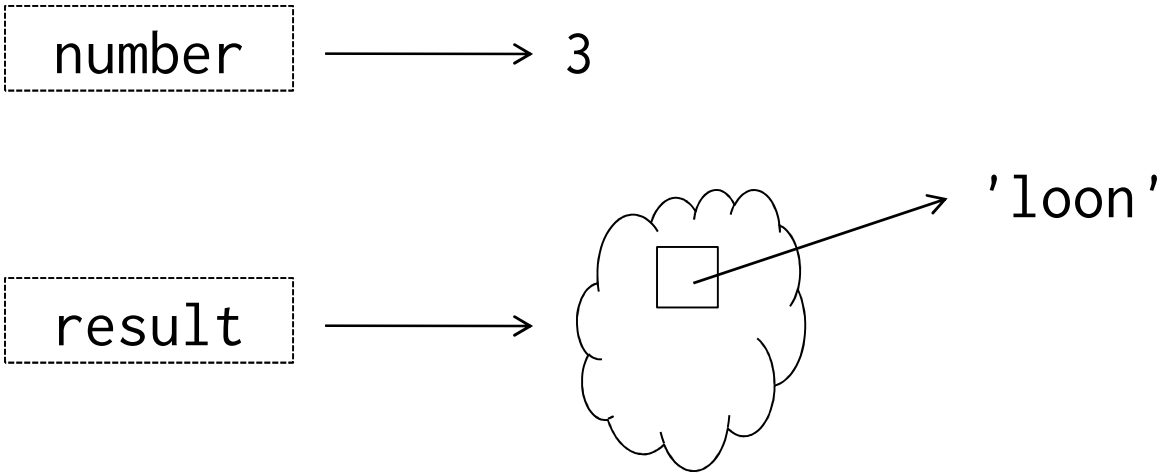

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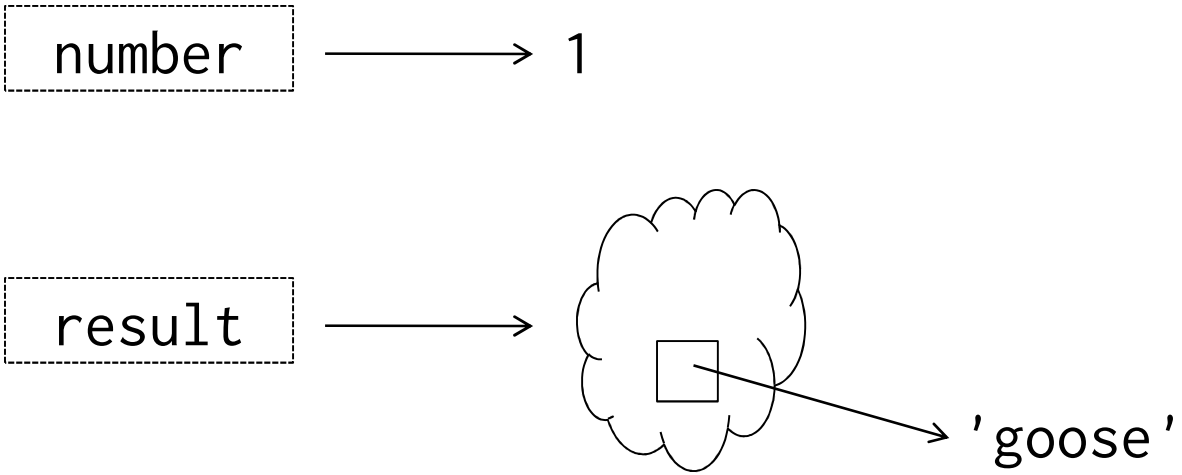

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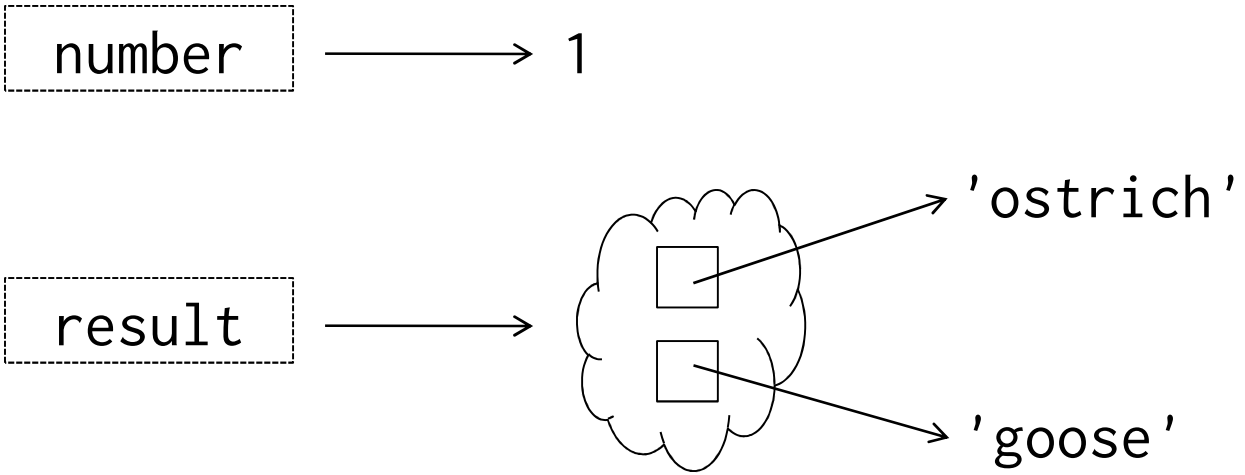

Case 3: tied equal for minimum

software carpentry

created by

Greg Wilson

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