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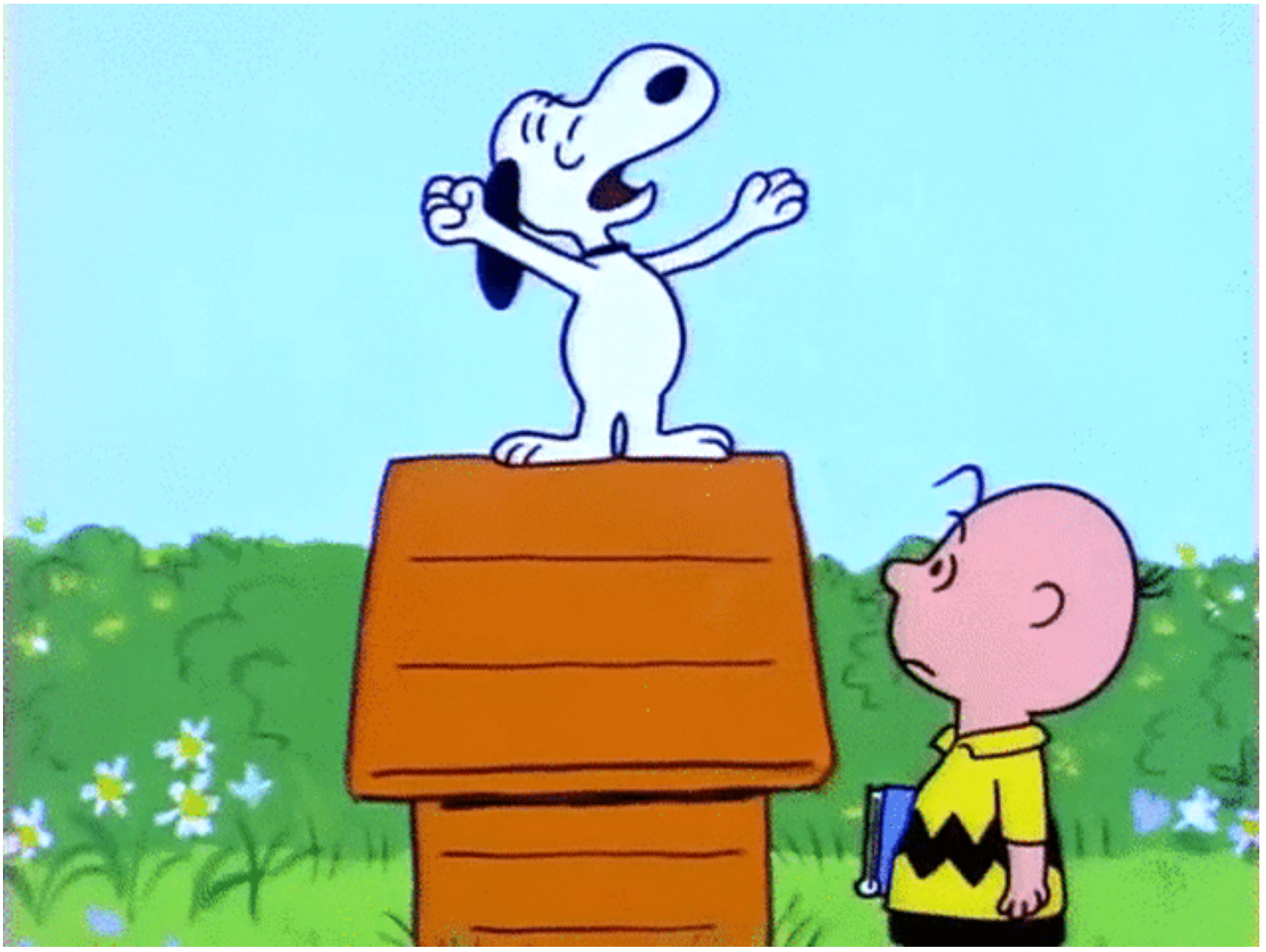

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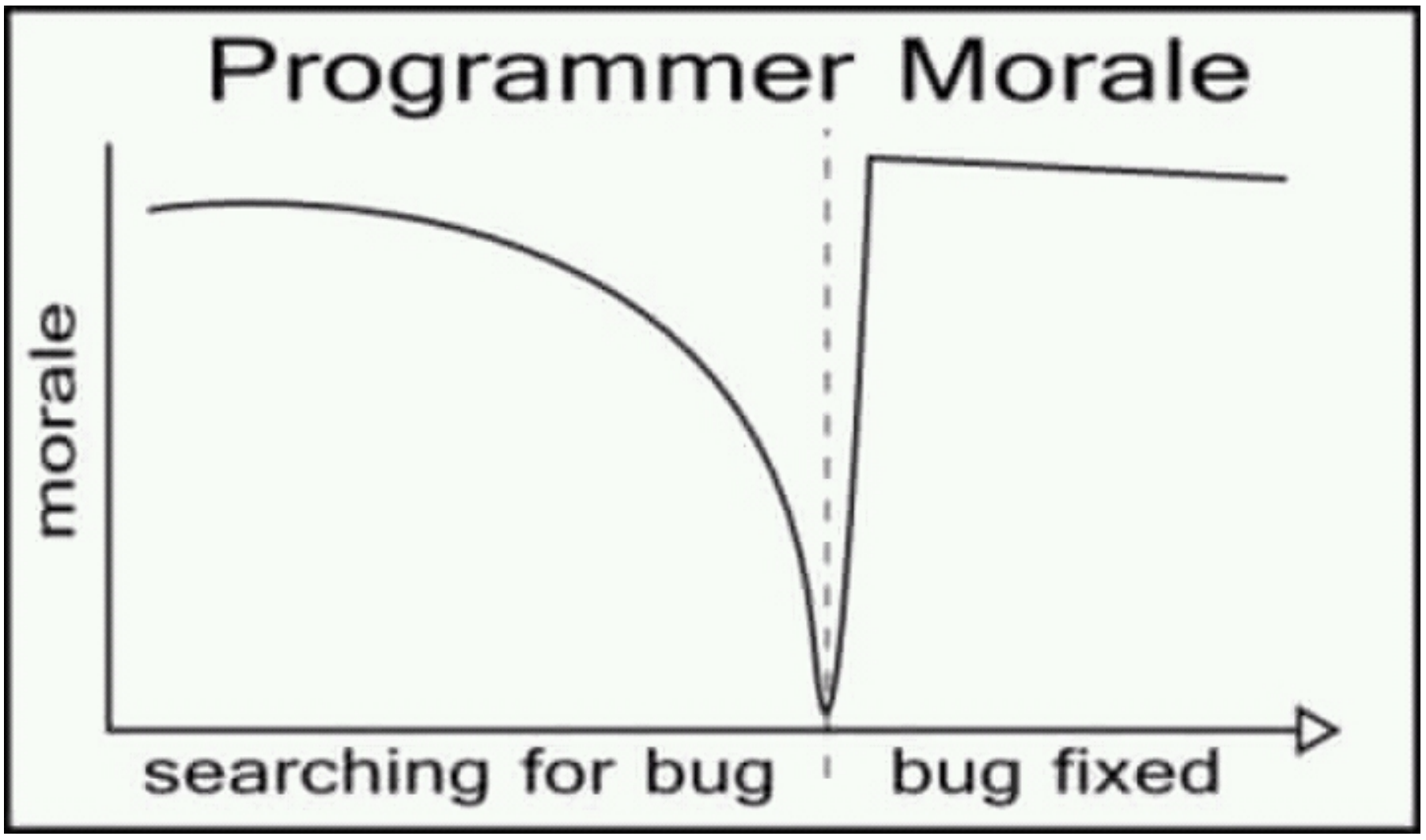

Turtle Runner

Do you have an idea of why I am thinking this was one of the coolest exercises in the entire seminar?

In [ ]:

```
import sys
from turtle import Turtle, done


def do_line(turtle, command, value):
    if command == 'Walk':
        turtle.forward(value)
    if command == 'Turn':
        turtle.right(value)


def main(path_to_file):
    dave = Turtle()
    dave.shape('turtle')
    with open(path_to_file, 'r') as script:
        for line in script:
            command, value = line.split(' ')
            value = int(value)
            do_line(dave, command, value)


if __name__ == '__main__':
    main(sys.argv[1])
    done()
```

Turtle Geometry

In [ ]:

```
from turtle import Turtle


class GeometryTurtle(Turtle):
    def make_rectangle(self, width, height):
        for _ in range(2):
            self.forward(width)
            self.left(90)
            self.forward(height)
            self.left(90)

    def make_square(self, width):
        self.make_rectangle(width, width)

    def make_star(self, length):
        for _ in range(5):
            self.forward(length)
            self.left(144)

    def make_triangle(self, length):
        for _ in range(3):
            self.forward(length)
            self.left(120)


my_turtle = GeometryTurtle()
my_turtle.make_square(50)
```

Loops

`for` loops and `while` loops

They can express the same. Remember Morten's slide!: This:

In [19]:

```
my_list = [1, 'elephant', 4, 'rats']

index = 0
while index < len(my_list):
    element = my_list[index]
    print(element)
    index += 1
```

```
1
elephant
4
rats
```

is the same as

In [ ]:

```
my_list = [1, 'elephant', 4, 'rats']

for element in my_list:
    print(element)
```

But I would like to write a `for` loop but still need the index

You may want to use the `enumerate` function.

In [17]:

```
1 print(help(enumerate))
```

```
Help on class enumerate in module builtins:

class enumerate(object)
 |  enumerate(iterable, start=0)
 |
 |  Return an enumerate object.
 |
 |    iterable
 |      an object supporting iteration
 |
 |  The enumerate object yields pairs containing a count (from start
, which
 |  defaults to zero) and a value yielded by the iterable argument.
 |
 |  enumerate is useful for obtaining an indexed list:
 |      (0, seq[0]), (1, seq[1]), (2, seq[2]), ...
 |
 |  Methods defined here:
 |
 |  __getattribute__(self, name, /)
 |      Return getattr(self, name).
 |
 |  __iter__(self, /)
 |      Implement iter(self).
 |
 |  __next__(self, /)
 |      Implement next(self).
 |
 |  __reduce__(...)
 |      Return state information for pickling.
 |
 |  ----------------------------------------------------------------
------
 |  Static methods defined here:
 |
 |  __new__(*args, **kwargs) from builtins.type
 |      Create and return a new object.  See help(type) for accurate
signature.

None
```

In [27]:

```
my_list = [1.0, 'elephant', 4.0, 'rats']

for idx, element in enumerate(my_list):
    print(idx)
    print(element)
    print(my_list[idx - 1])
```

```
0
1.0
rats
1
elephant
1.0
2
4.0
elephant
3
rats
4.0
```

The last basic data type: `tuple`

A list:

In [5]:

```
my_list = [1, 'elephant', 4, 'rats']
```

A tuple, is an immutable list

In [28]:

```
my_list = [1, 'elephant', 4, 'rats']
my_tuple = (1, 'elephant', 4, 'rats')

print(my_list[1])
print(my_tuple[2])
```

```
elephant
4
```

In [29]:

```
my_list = [1, 'elephant', 4, 'rats']
my_tuple = (1, 'elephant', 4, 'rats')

my_list[1] = 'mouse'
print(my_list[1])
my_tuple[1] = 'mouse'
print(my_tuple[2])
```

```
mouse

---------------------------------------------------------------------
-------
TypeError                                 Traceback (most recent cal
l last)
<ipython-input-29-588241f7057d> in <module>
      4 my_list[1] = 'mouse'
      5 print(my_list[1])
----> 6 my_tuple[1] = 'mouse'
      7 print(my_tuple[2])

TypeError: 'tuple' object does not support item assignment
```

The `type` function revisited

Now, that we started with object-oriented programming, the `type` function likely makes more sense. You give it an object and it tells you of which class (type) that object is an `instanceof` .

In [12]:

```
print(help(type))
```

```
Help on class type in module builtins:

class type(object)
 |  type(object_or_name, bases, dict)
 |  type(object) -> the object's type
 |  type(name, bases, dict) -> a new type
 |
 |  Methods defined here:
 |
 |  __call__(self, /, *args, **kwargs)
 |      Call self as a function.
 |
 |  __delattr__(self, name, /)
 |      Implement delattr(self, name).
 |
 |  __dir__(self, /)
 |      Specialized __dir__ implementation for types.
 |
 |  __getattribute__(self, name, /)
 |      Return getattr(self, name).
 |
```

```
 |  __init__(self, /, *args, **kwargs)
 |      Initialize self.  See help(type(self)) for accurate signatur
e.
 |
 |  __instancecheck__(self, instance, /)
 |      Check if an object is an instance.
 |
 |  __repr__(self, /)
 |      Return repr(self).
 |
 |  __setattr__(self, name, value, /)
 |      Implement setattr(self, name, value).
 |
 |  __sizeof__(self, /)
 |      Return memory consumption of the type object.
 |
 |  __subclasscheck__(self, subclass, /)
 |      Check if a class is a subclass.
 |
 |  __subclasses__(self, /)
 |      Return a list of immediate subclasses.
 |
 |  mro(self, /)
 |      Return a type's method resolution order.
 |
 |  ----------------------------------------------------------------
------
 |  Class methods defined here:
 |
 |  __prepare__(...)
 |      __prepare__() -> dict
 |      used to create the namespace for the class statement
 |
 |  ----------------------------------------------------------------
------
 |  Static methods defined here:
 |
 |  __new__(*args, **kwargs)
 |      Create and return a new object.  See help(type) for accurate
signature.
 |
 |  ----------------------------------------------------------------
------
 |  Data descriptors defined here:
 |
 |  __abstractmethods__
 |
 |  __dict__
 |
 |  __text_signature__
 |
 |  ----------------------------------------------------------------
------
 |  Data and other attributes defined here:
 |
 |  __base__ = <class 'object'>
 |      The most base type
```

```
|
|   __bases__ = (<class 'object'>,)
|
|   __basicsize__ = 864
|
|   __dictoffset__ = 264
|
|   __flags__ = 2148291584
|
|   __itemsize__ = 40
|
|   __mro__ = (<class 'type'>, <class 'object'>)
|
|   __weakrefoffset__ = 368
```

```
None
```

`script1.trtl.txt` vs. `script1.trtl`

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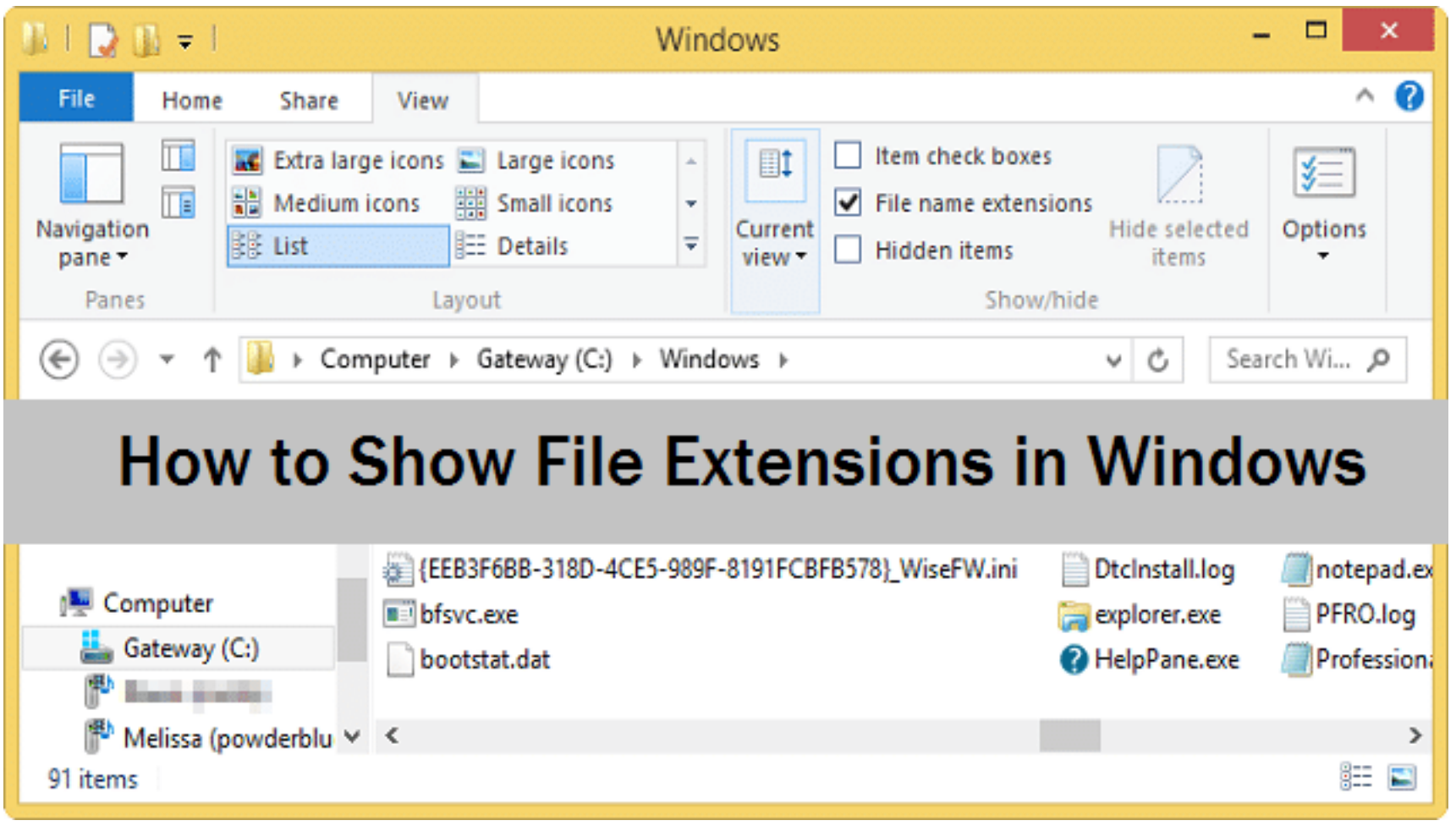

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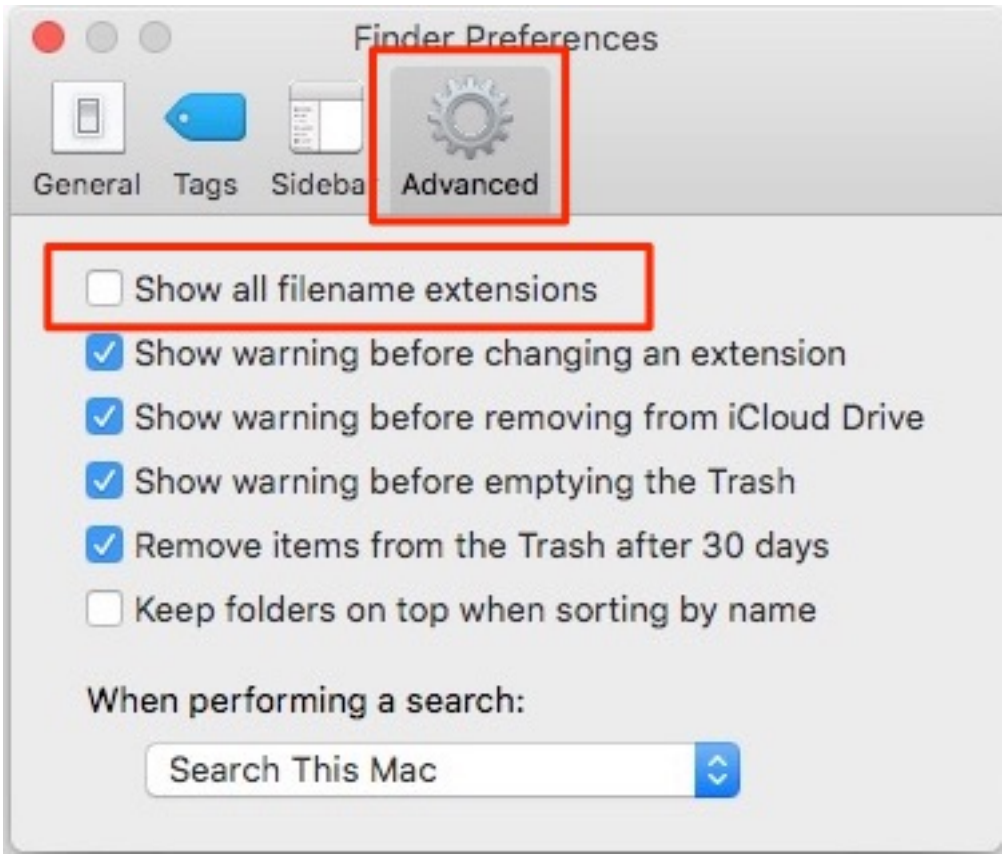

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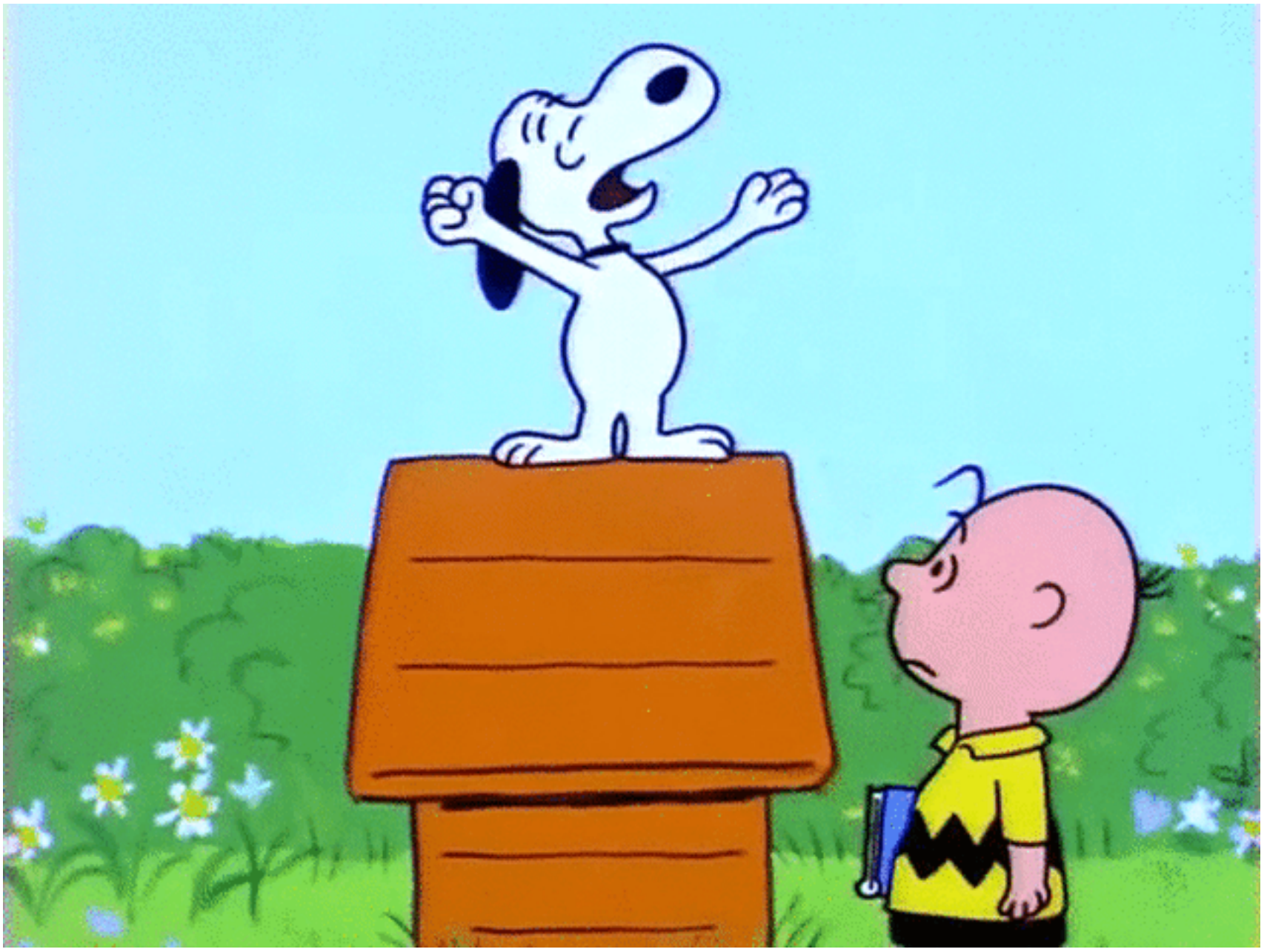

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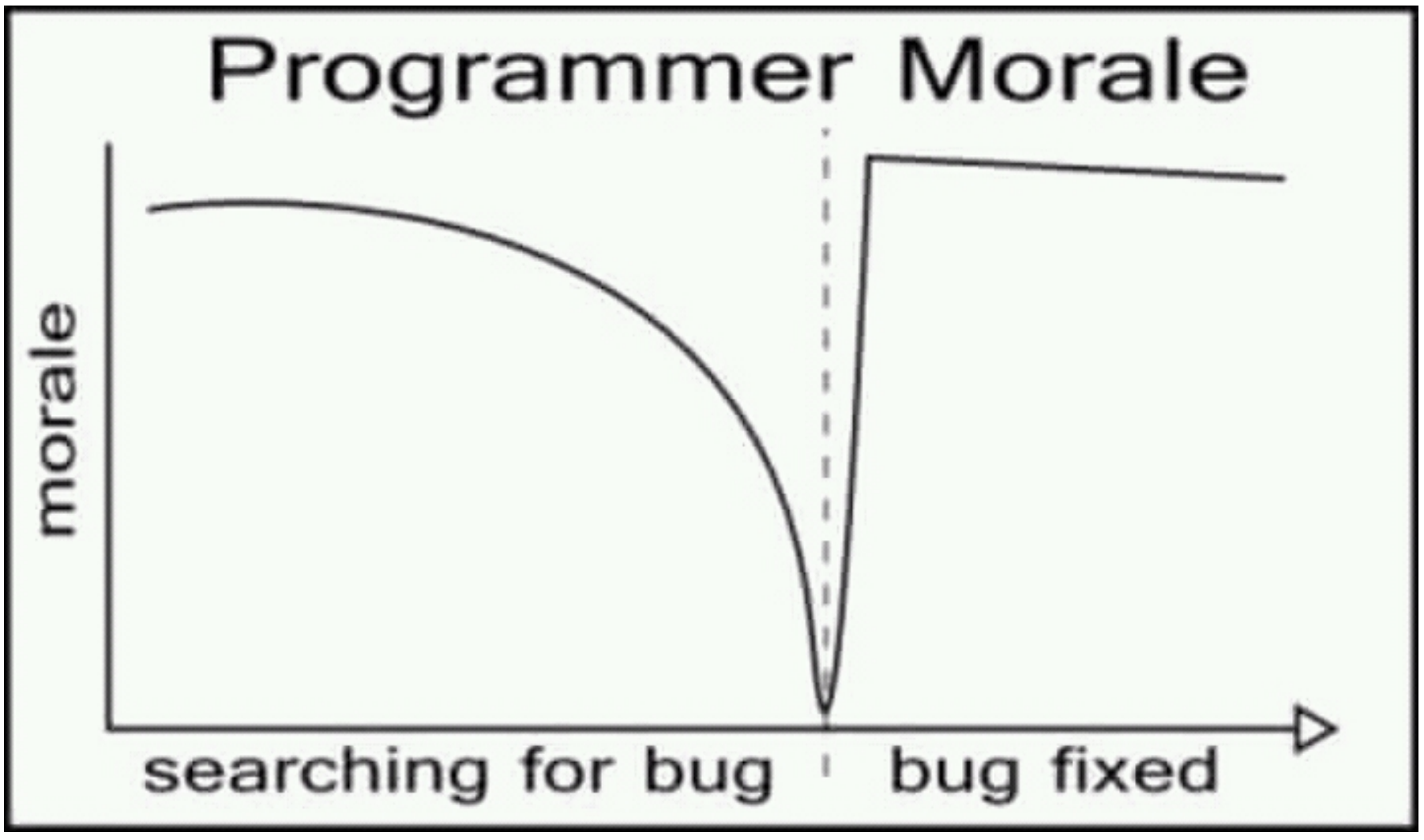

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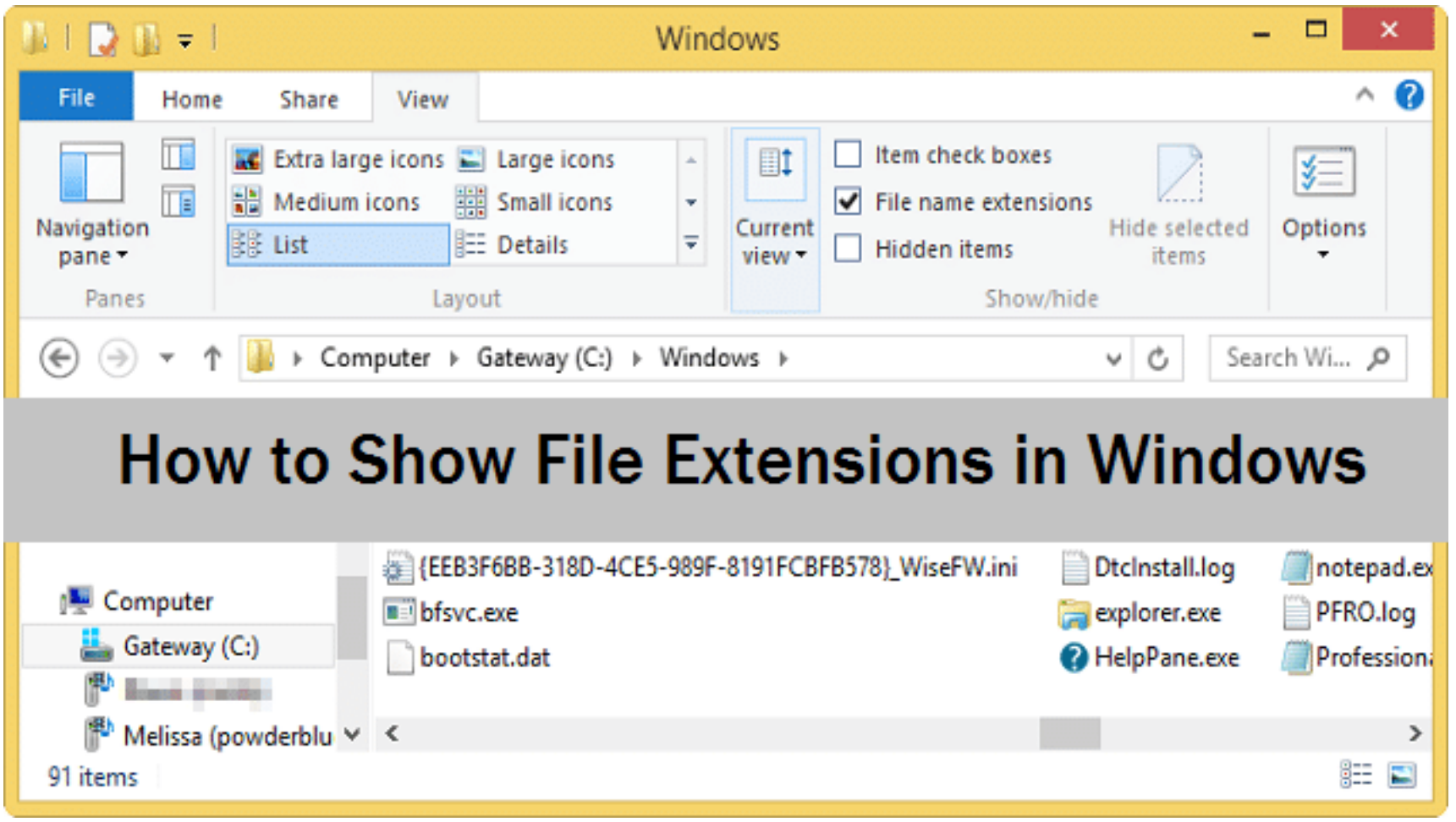

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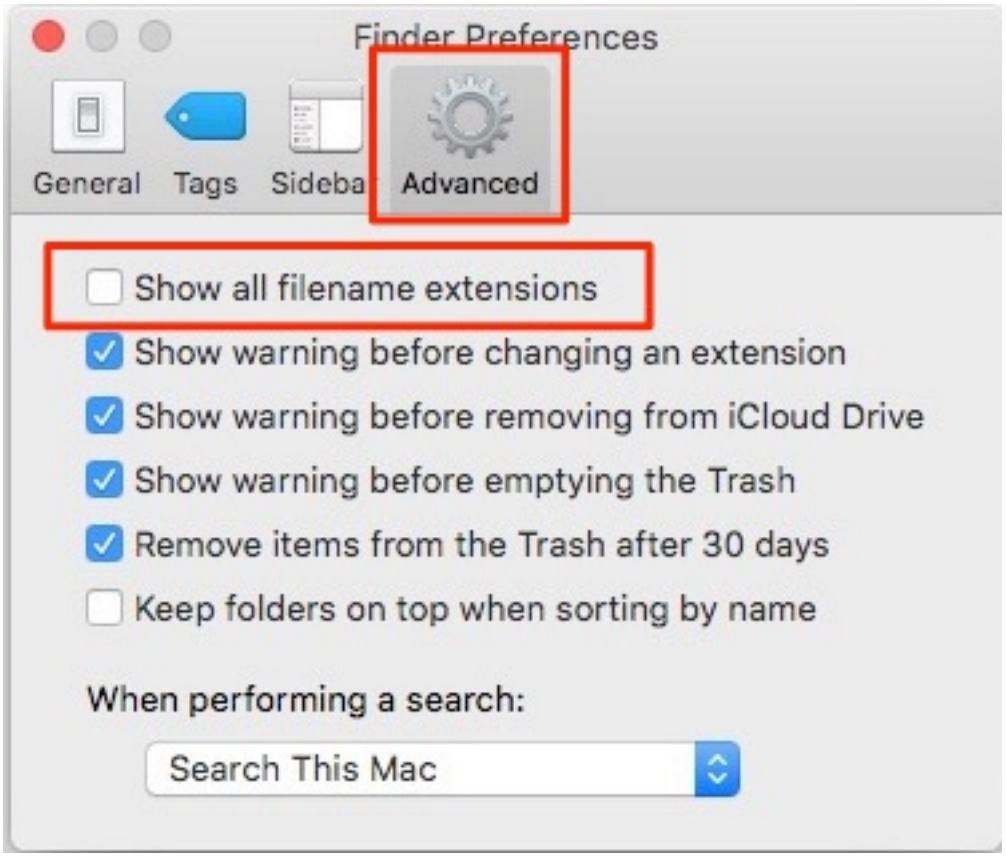

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