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Programming (<https://www.sitepoint.com/programming/>) > May 03, 2012 > By [Jeff Friesen](https://www.sitepoint.com/author/jfriesen/)

Add a Web Console to Your Toolbox, Part 1



A *console* is a software artifact for reading line-oriented textual input from the keyboard and writing line-oriented textual output to the screen.

Consoles are often used to implement operating system command-line interfaces (http://en.wikipedia.org/wiki/Command-line_interface), but are also handy in text-based adventure games (http://en.wikipedia.org/wiki/Adventure_game#Text_adventure), and other contexts.

Although text-oriented consoles are not as popular as they once were because of the proliferation of graphical user interfaces, they can be useful to power users (http://en.wikipedia.org/wiki/Power_user), who are not intimidated by this style of interface. Also, consoles can open up a new class of web application such as the embedded browser shell ([http://en.wikipedia.org/wiki/Shell_\(computing\)](http://en.wikipedia.org/wiki/Shell_(computing))).

This article begins a two-part series that presents a JavaScript-based console library for use with web applications that may benefit from this style of user interface. Part 1 introduces you to the library's simple API along with a browser shell application that serves as a useful demonstration of this API. Part 2 shows you how the library is implemented so that you can modify it to meet additional requirements.

Explore the Console Library

The console library consists of a global object named **Console** with several properties. This arrangement minimizes pollution of the global namespace. Furthermore, it reflects my desire to avoid supporting multiple consoles, as I find it easier to implement a singleton console.

Console provides the following features:

easy initialization based on number of desired rows and columns (the `<canvas>` tag requires only an `id` attribute)

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canvas placed in tab order and gains keyboard focus immediately for browsers such as Firefox

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clear console capability

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green on black text with monospace font

visible cursor that marks the current input position

text echoing capability

vertically scrollable when text flows past the lower-right character position

simplified editing in terms of the backspace key

automatically call a function when no input is available

supports FireFox, Internet Explorer, Chrome, Opera, and Safari

Although **Console** encapsulates multiple accessible properties, I consider only four of them to be members of the “public” API. The other properties should not be accessed; they exist to support the following four properties and could change in a subsequent version of the library:

init(canvasName, numCols, numRows) initializes the console. The string passed to **canvasName** must match the value of an existing `<canvas>` element’s `id` attribute. The integer passed to **numCols** identifies the desired number of columns (e.g., 80), and the integer passed to **numRows** identifies the desired number of rows (e.g., 25). The console is cleared and the cursor position is set (0, 0). The resulting console displays green text on a black background. This function does not return a value.

clear() clears the console and sets the cursor position to (0, 0). This function does not return a value.



getLine(callback) returns a line of input and echoes this input to the console. It first checks if a line has been entered by hitting **Enter** or **Return** (the key with the symbol **↵** on it).

If **Enter** or **Return** is present in the input, the line is returned without the newline character. If a newline is not present, or if there is no input, the function returns null. When a function is passed to **callback**, that function is called when **getLine()** returns. If nothing has been entered, **getLine()** returns null.

echo(msg) echoes the string passed to **msg** to the console starting at the cursor position, which is updated. The console scrolls vertically when the message flows past the lower-right corner. This function recognizes **b** (backspace) and **n** (newline) special characters. Also, it does not return a value.

The **getLine(callback)** function does not block the current thread while waiting for the user to press **Enter**/**Return**. Instead, it returns immediately. It does so because JavaScript code runs on a single thread. (HTML5's web workers are an exception, and are beyond the scope of this article.) Blocking this thread for longer than what the browser considers acceptable causes the browser to display a dialog box that reports an unresponsive script.

The console library is easy to use. After defining a **<canvas>** element, and after initializing and echoing any preliminary text to the console, repeatedly execute a function via JavaScript's **setInterval()** function. Each execution should invoke **getLine(callback)** (with an optional callback function) and then take appropriate action based on **getLine()**'s return value. Listing 1 presents the HTML for a simple demonstration of this library.



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✕



```
<html>
```

```
<head>
```

```
<title>
```

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```
</title>
```

```
<meta http-equiv="X-UA-Compatible" content="IE=Edge"/>
```

```
<script src="../../Console/Console.js">
```

```
</script>
```

```
</head>
```

```
<body style="text-align: center">
```

```
<p>
```

```
<h2>
```

Console Demo

```
</h2>
```

```
<canvas id="mycanvas">
```

HTML5 canvas element not supported by this browser.

```
</canvas>
```

```
<p>
```

You might have to press the Tab key or click the canvas to give it keyboard focus.

```
</p>
```

```
<script>
```

```
  Console.init("mycanvas", 64, 16);
```

```
  Console.echo(">");
```

```
  function tick()
```

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```
{
```

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```
if (line != null)
```

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```
if (line != "")
```

```
    Console.echo(line+"\n");
```

```
    Console.echo(">");
```

```
}
```

```
}
```

```
setInterval("tick()", 50); // Invoke tick() every 50 milliseconds.
```

```
</script>
```

```
</body>
```

```
</html>
```

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Listing 1: Echoing entered text on the console

Listing 1 describes `ConsoleDemo.html`. This listing is fairly straightforward, except perhaps for the `<meta>` element. This element enforces a compatibility mode (<http://blogs.msdn.com/b/askie/archive/2009/03/23/understanding-compatibility-modes-in-internet-explorer-8.aspx>), — use latest standards rendering mode — so that the console will work under Internet Explorer 9 (and probably higher versions of this browser). Otherwise, Explorer outputs an error message about the Canvas API's `getContext()` function not being defined.

Listing 1 continues with a `<script>` element that includes the contents of a JavaScript source file named `Console.js`. This file defines the console library and is located in a `Console` directory that's accessed relative to `ConsoleDemo.html`. The code file that's attached to this article contains `ConsoleDemo.html` and `Console.js` in appropriate directories relative to each other, so you should be able to run `ConsoleDemo` without problems.

The body of this HTML file specifies a `<canvas>` element whose `id` attribute is assigned `mycanvas`. No other attribute is required because the console library takes care of them. The body also contains a `<script>` element that presents the console demonstration code.

The code first initializes the canvas to a 64-column-by-16-row drawing area — I chose these values because they were the dimensions of the text screen on my old S300 terminal. The code then creates a `>` character in the console as the initial input to the prompt.

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At this point, `tick()` is defined for repeated execution. This function will be executed every 50 milliseconds, courtesy of

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`tick()` first invokes `getLine()` without passing a callback function because none is needed in this example. If this function returns null because nothing has been entered or the user is typing some input (and has not yet pressed Enter/Return), nothing further happens. Otherwise, if the returned line is not equal to the empty string (only Enter/Return was pressed), the entered text followed by a newline is echoed to the console. At this point, a `>` prompt is echoed to inform the user that another line of input is expected.

Figure 1 shows you the resulting console in the context of Firefox.



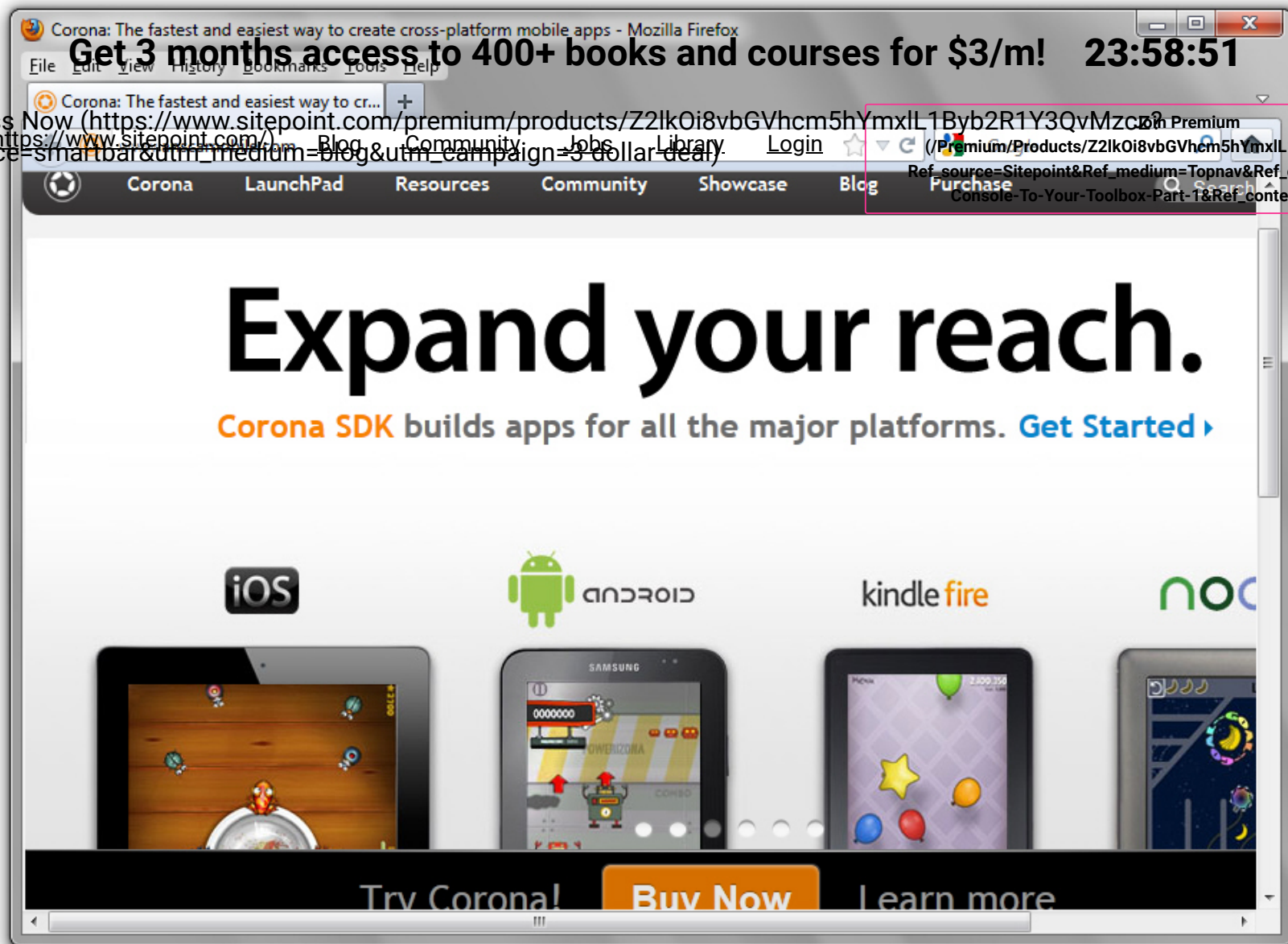


Figure 1: You don't have to press Tab to start using the console on Firefox.

Encounter a Browser Shell

A shell ([http://en.wikipedia.org/wiki/Shell_\(computing\)](http://en.wikipedia.org/wiki/Shell_(computing))), provides an operating system's user interface, and its primary purpose is to run programs.

Modern operating systems feature a variety of shells, or command-line interpreters (e.g. GNU, Bourne

shells). A similar shell can be embedded within a web page via the console library, and this *browser shell* can be used to execute browser-oriented

commands. <https://www.sitepoint.com/shell-application-as-a-useful-demonstration-of-the-console-library/> Figure 2 reveals this application's console in the context of the Internet Explorer 9 browser.

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The screenshot shows a Mozilla Firefox browser window displaying the 'Download Corona SDK' registration page. The page has a dark navigation bar with links: Corona, LaunchPad, Resources, Community, Showcase, Blog, and Purchase. The main content area is titled 'Download Corona SDK' and features a Corona SDK logo and a description: 'Corona SDK is the world's #1 tool for cross-platform mobile development.' Below this is a 'Learn why' link and a small image of a game. To the right is a 'Register' form with fields for 'Email address' (containing 'jeff@tutortutor.ca'), 'Password', and 'Confirm Password'. There is a 'Sign in' button for existing users and a 'Continue' button at the bottom. A checkbox for 'I accept the Terms and Conditions of Use.' is also present.

Corona SDK is the world's #1 tool for cross-platform mobile development.

Learn why

Best-selling games and apps are made with

Register

Already a user? [Sign in](#)

Email address *

jeff@tutortutor.ca

Password *

Confirm Password *

☒ I accept the [Terms and Conditions of Use.](#)

[Continue](#)

(<http://www.sitepoint.com/wp-content/uploads/2012/05/figure2.jpg>).

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Figure 2: The browser shell currently supports four commands.

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Figure 2 reveals an interesting anomaly: geolocation information is not immediately displayed. Instead, it appears multiple lines later in the browser. You will learn the reason while exploring Listing 2.





```
<html>
```

```
<head>
```

```
<title>
```

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```
</title>
```

```
<meta http-equiv="X-UA-Compatible" content="IE=Edge"/>
```

```
<script src="../../Console/Console.js">
```

```
</script>
```

```
</head>
```

```
<body style="text-align: center">
```

```
<p>
```

```
<h2>
```

Browser Shell

```
</h2>
```

```
<canvas id="mycanvas">
```

HTML5 canvas element not supported by this browser.

```
</canvas>
```

```
<p>
```

You might have to press the Tab key or click the canvas to give it keyboard focus.

```
</p>
```

```
<script>
```

```
  Console.init("mycanvas", 64, 22);
```

```
  Console.echo("Browser Shell 1.0nn");
```

```
  Console.echo("Type 'help' (without the quotes) to obtain helpnn");
```

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```
Console.echo(">");
```

```
var geo = "";
```

```
function callback()
```

```
(https://www.sitepoint.com/)
```

```
if (geo == "")
```

```
return;
```

```
Console.echo(geo+"\n");
```

```
Console.echo(">");
```

```
geo = "";
```

```
}
```

```
function tick()
```

```
{
```

```
var line = Console.getLine(callback);
```

```
if (line != null)
```

```
{
```

```
line = line.trim();
```

```
if (line == "browser")
```

```
Console.echo(navigator.userAgent+"\n");
```

```
else if (line == "cls") Console.clear();
```

```
else if (line ==
```

```
"geo") { Console.echo("querying location info...may take a few moments\n");
```

```
function report_error(error) { geo =
```

```
error.message; if (geo == "") // geo is "" on Safari geo = "unknown error"; }
```

```
function report_geolocation_query(
```

```
position) { geo = "Lat: "+position.coords.latitude+", Lon: "+position.coords.longitude; }
```

```
navigator.geolocation.
```

```
getCurrentPosition(report_geolocation_query, report_error); }
```

```
else if (line == "help") { Console.echo("Available
```

```
commands...\n"); Console.echo("browser -- display current browser info\n");
```

```
Console.echo("cls -- clear screen\n");
```

```
Console.echo("geo -- obtain geolocation information\n");
```

```
Console.echo("help -- display this help text\n"); }
```

```
else if
```

```
(line != "") Console.echo("bad command\n");
```

```
Console.echo(">"); }
```

```
} } setInterval("tick()", 50); // Invoke tick() every 50
```

```
milliseconds. </script> </body> </html>
```

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Listing 2: Interpreting and executing commands

output:

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>hellat: 49.88, Lon: 49.88

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Conclusion

Console is a useful tool for embedding a simple console into web pages. The previous browser shell application gives you an idea of what's possible. You might want to extend this application with additional commands, such as a `dir` command for obtaining a directory listing of web storage (<http://www.w3.org/TR/webstorage/>). However, you first need to understand how this library works, and that is the subject of Part 2.

Note

All files pertaining to this article are located in [code.zip \(http://www.sitepoint.com/wp-content/uploads/2012/05/code.zip\)](http://www.sitepoint.com/wp-content/uploads/2012/05/code.zip).



Meet the author

Jeff Friesen (<https://www.sitepoint.com/author/jfriesen/>)

Jeff Friesen is a freelance tutor and software developer with an emphasis on Java and mobile technologies. In addition to writing Java and Android books for Apress, Jeff has written numerous articles on Java and other technologies for SitePoint, InformIT, JavaWorld, java.net, and DevSource.

[Web \(https://www.sitepoint.com/web/\)](https://www.sitepoint.com/web/) > January 30, 2020 > By [Shaumik Daityari \(https://www.sitepoint.com/author/sdaityari/\)](https://www.sitepoint.com/author/sdaityari/)

How to Tackle a Python Interview

Have you cleared the first round of calls with HR? Are you going for a Python interview in person? If you're wondering what Python-related questions may be asked in the first round, **Get 3 months access to 400+ books and courses for \$3/m! 23:58:51**

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A word of caution before we start. This guide talks primarily about Python's built-in capabilities. The aim of this guide is to help you get up to speed with the inherent Python functionalities that enable quick development. So we won't be able to cover every question you may face from the various types of companies out there.

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Development in Python: Project Architecture

What is Python? Why should you use Python?

If you're interviewing for a Python role, you should have a clear idea of what Python is and how it's different from other programming languages. Here are a few key points regarding Python that you should be aware of.

First, you should not be wrong about the etymology. A large section of Python programmers wrongly think that Guido van Rossum named it after the snake! On the contrary, Python is named after British sketch comedy [Monty Python's Flying Circus](https://en.wikipedia.org/wiki/Monty_Python%27s_Flying_Circus) (https://en.wikipedia.org/wiki/Monty_Python%27s_Flying_Circus).

Next, Python is a high level, object-oriented, interpreted programming language. This means that Python code is executed line by line. Python is also dynamically typed, as it doesn't require you to specify the type of variables when declaring them.



Given Python's ease of use, it has found uses for common automation tasks. Python is often the go-to scripting choice for programmers who know multiple languages. With more things getting automated, Python's share of the market has increased significantly in recent years.

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Limitations of Python

While it's good to know about the capabilities of a programming language, it's also good to be aware of its limitations to truly comprehend the situations you need to be wary of.

The first limitation of Python is execution speed. Though development in Python is quick, executing a similar block of Python code is often slower compared to compiled languages such as C++. For this reason, hackathons often give Python programs some extra time for execution. There are ways to circumvent this issue, though. For instance, you can integrate Python with a compiled language like C to perform the core processing through the other language.

In a world which is going mobile first, Python is not native to mobile development. You will rarely find mobile applications developed in Python. The two major mobile operating systems, Android and iOS, don't support Python as an official programming language.

Package Determination: Django vs Flask

In addition to Python's capabilities and limitations, a category of questions that are popular in interviews focuses around choosing between packages based on your requirements. Let's look at one approach that you may take when tackling such questions.

Let's say you're given a choice between Django and Flask to start a web application. The answer to this question should lie within an amalgamation of the requirements of the project and the culture of the organization.

At the outset, you should know that with the use of plugins, there's no right answer here: you can create the similar applications using either framework. However, there's a stark difference between the design philosophies of each framework. Flask provides you the bare minimum features for you to create a web application like URL routing, templating, unit testing and a development server, thereby giving you a lot of freedom to design your application. On the other hand, Django provides you a large array of built in features from the beginning — database support, extensive admin functionality, and security features.



If you're building an application that will use relational databases, with a lot of dynamic content, you should probably choose Django. However, if you're looking for a lot of free resources, you should check out the **Pythonic Way of Programming** books and courses for \$3/m! **23:58:51**

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A significant part of a Python interview consists of hands-on programming. It may be in the form of finding the output or reviewing code snippets, or simply a discussion on specific Python features that would help in certain scenarios. In this section, we look at various features and guidelines for Python development.

Looping zip and enumerate

The way you create loops in Python is different from other programming languages. Python's built-in functions **zip** and **enumerate** help you create more effective loops that run quicker. Let's see the demonstration of these two functions.

Suppose you'd like to access corresponding elements from two different lists. You could loop over the length of the lists and access the corresponding element from each list. For instance, the following code prints the car and its corresponding manufacturer:

```
cars = ['CR-V', 'Silverado', 'F-150']
manufacturers = ['Honda', 'GM', 'Ford']

for i in range(len(cars)):
    print(cars[i], manufacturers[i])
```

This can be achieved using a simpler function in Python, **zip**:

```
for car, manufacturer in zip(cars, manufacturers):
    print(car, manufacturer)
```

In this example, **zip** creates pairs between the elements of the two lists. It may also be used to join more than two lists.



Let's see how `enumerate` works. If you'd like to access the index as well as the value of elements of a list, you could run the following snippet:

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✕

However, the `enumerate` function does the same task:

```
for i, car in enumerate(cars):  
    print (i, car)
```

Use of `zip` and `enumerate` not only makes your code condense, but makes it run faster too.

Single-line List Operations

If you'd like to modify elements of a list, you may wish to use a function like `map`, perhaps as follows:

```
numbers = [1, 2, 3, 4, 5]  
  
def squared(num):  
    return num**2  
  
squares = map(squared, numbers)
```


However, Python allows single-line list operations to achieve such tasks. Two ways of achieving the same task are shown below:

```
squares = [squared(x) for x in numbers]  
squares = [x**2 for x in numbers]
```



Further, you can use a single line `if ... else` statements within such an operation too:

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You can also use lambda expressions (<https://docs.python.org/3/tutorial/controlflow.html#lambda-expressions>) in these single-line operations.

Debugging with pdb

While you may use print statements to debug your code in other programming languages, Python comes with an in-built debugger, **pdb**. Insert the following line of code in your program, and execution stops at that line for you to debug the environment:

```
import pdb; pdb.set_trace()
```

All variables and functions available till that point are available for you to inspect and find any error.

Data Structures

To utilize the full capabilities of Python, you must be comfortable with the built-in data structures. A list is a collection of items, which may not be of the same type. A tuple is similar to a list, but is immutable. A set is an unordered collection of items and doesn't have any duplicates. A dictionary is a collection of key-value pairs.

You must be aware of various situations in which these data structures may be used.

Final Thoughts

With this, we come to the end of our considerations for a Python interview. Hopefully they've provided you with some helpful guidelines on how to prepare for your next interview. Good luck!

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Shaumik (<http://shaumik.theblogbowl.in/>) is a data analyst by day, and a comic book enthusiast by night (or maybe, he's Batman?) Shaumik has been writing tutorials and creating screencasts for over five years. When not working, he's busy automating mundane daily tasks through meticulously written scripts!

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