**What Is CGI?**

The Common Gateway Interface (CGI) is an interface to the Web server that enables you to extend the server's functionality. Using CGI, you can interact with users who access your site. On a theoretical level, CGI enables you to extend the capability of your server to parse (interpret) input from the browser and return information based on user input. On a practical level, CGI is an interface that enables the programmer to write programs that can easily communicate with the server.

Normally, if you wanted to extend the Web server's capabilities, you would have to modify the server yourself. This is an undesirable solution because it requires a low-level understanding of network programming over the Internet and the World Wide Web protocol. It would also require editing and recompiling the server source code or writing a custom server for each task. For example, suppose you want to extend your server to act as a Web-to-e-mail gateway that would take user input from the browser and e-mail it to another user. You would have to insert code into the server that would parse the input from the browser, e-mail the input to the other user, and send a response back to the browser over a network connection.

First, such a task requires having access to the server code, something that is not always possible. Second, it is difficult and requires extensive technical knowledge. Third, it works only for your specific server. If you want to move your Web server to a different platform, you would have to start over or at least spend a lot of time porting the code to that platform.

**Why CGI?**

CGI provides a portable and simple solution to these problems. The CGI protocol defines a standard way for programs to communicate with the Web server. Without much special knowledge, you can write a program in any computer language that interfaces and communicates with the Web server. This program will work with all Web servers that understand the CGI protocol.

CGI communication is handled over the standard input and output, which means that if you know how to print and read data using your programming language, you can write a Web server application. Other than parsing the input and output, programming CGI applications is almost equivalent to programming any other application. For example, if you want to program a "Hello, world!" program, you use your language's print functions and the format defined for CGI programs to print the proper message.

**Choosing Your Language**

Because CGI is a "common interface," you are not restricted to any specific computer language. An important question many people ask is what programming languages can you use to program CGI? You can use any language that can do the following:

* Print to the standard output
* Read from the standard input
* Read from environment variables

Almost all programming languages and many scripting languages perform these three activities, and you can use any one of them.

Languages fall under one of the following two classes: compiled or interpreted. A compiled language-such as C or C++-tends to be smaller and faster, whereas interpreted languages-such as Perl or Rexx-require loading a sometimes large interpreter upon startup. Additionally, you can distribute binaries (code compiled into machine language) without source code if your language is compiled. Distributing interpreted scripts normally means distributing the source code.

Before you choose your language, you must first consider your priorities. You need to balance the speed and efficiency gains of one programming language versus the ease of programming in another. If you think you want to learn another language rather than use one you already know, carefully weigh the advantages and disadvantages of the two languages.

Perhaps the two most commonly used languages for CGI programming are C and Perl (both of which are covered in this book). Both have their own distinct advantages and disadvantages. Perl is a very high-level yet powerful language especially useful for parsing text. Although its ease of use, flexibility, and power make it an attractive language for CGI programming, its relatively large size and slower performance sometimes makes it unsuitable for certain applications. C programs are smaller, more efficient, and offer more low-level control over the system, and yet are more difficult to program, do not have easy built-in text processing routines, and are more difficult to debug.

Which language is the superior CGI programming language? Whichever language you are most comfortable programming. Both are just as effective for programming CGI applications, and with the proper libraries, both have similar capabilities. However, if you have a heavily accessed server, you might want to use smaller compiled C programs. If you need to quickly write an application that requires a lot of text processing, you might want to use Perl instead.

**Caveats**

There are some important alternatives to CGI applications. Many servers now include a programming API that makes it easier to program direct extensions to the server as opposed to separate CGI applications. Server APIs tend to be more efficient than CGI programs. Other servers include built-in functionality that can handle special features without CGI such as database interfacing. Finally, some applications can be handled by some new client-side (rather than server-side) technologies such as Java. With such rapid change in technology, is CGI rapidly becoming obsolete?

Probably not. CGI has several advantages over the newer technologies.

* It is "common," or portable. You can write a CGI application using almost any programming language on any platform. Some of the alternatives such as server APIs restrict you to certain languages and are much more difficult to learn.
* Client-side technologies such as Java aren't likely to replace CGI because there are certain applications that server-side applications are much better suited to perform.
* Many of the limitations of CGI are limitations of HTML or HTTP. As the standards for the Web in general evolve, so does the capability of CGI.

**Summary**

The Common Gateway Interface is the protocol by which programs interact with Web servers. The versatility of CGI gives programmers the opportunity to write gateway programs in almost any language, although there are many trade-offs associated with different languages. Without this ability, making interactive Web pages would be difficult at best, requiring modifications to the server and putting interactivity out of the reach of most programmers who are not also site administrators.