

# TEST SERVLETS



## MANUAL

*Programs for browser-based  
testing and assessment.*

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<http://www.scienceacademy.com>  
*testing and assessment any where any time*

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## Welcome

*Congratulations on your choice to use Test Servlets. Test Servlets will assist you in performing testing and assessment on most browser-based computers.*

*Testing and assessment are important because these processes can provide a measure of achievement and indicate areas of deficiency -- where additional information, instruction, study, or changes in strategy may be required to assist the student/worker in fulfilling academic or knowledge-base requirements. Your use of this software validates the importance of testing and assessment. Your participation is welcomed and appreciated.*

## What are Test Servlets

*Test Servlets* are programs for browser-based testing and assessment that reside on a Java Web server for delivery on the Web (Internet) or local browser-based network (LAN).

*Test Servlets* present and track Fill-In questions, Multiple Choice questions, and True or False questions. These programs give you the capability to do local and remote testing and assessment and the ability to conduct surveys.

With *Test Servlets*, you can immediately measure performance and evaluate the effectiveness of your instruction, presentation, or delivery strategy. The servlets compliment existing web-based training and augment and support distance and home school learning strategies. They can also be used as tools in norm-referenced testing and criterion-referenced testing.

*Test Servlets* support the Java Servlet 2.4 API or later.



## Features and Benefits

- Integrated features - testing, scoring, email delivery-any time and any where.
- Simplicity of End-User (test-taker) experience -- questions may be presented one at a time or a test at a time. Results are immediate. "Kids can't wait".
- Supports multiple media types (images, sound); freedom of background design (customizable).
- Supports multiple tests and users simultaneously. All tests, except True/False, support 20 questions (10 questions in True/False). More questions and tests are possible as linked tests.
- Survey capabilities have been added.
- Save development time, money and resources - relatively low cost solution (license vs. produce internally or contract).
- Servlets are server based; there is no need for clients to be updated.
- Technologically Innovative - best technology for testing. Benefits of Java - multi-platform capability (Mac/PC), scale ability, and security. (78% developers choose Java over .net - IDG Dec, 2001, InfoWorld Dec 21,2001)
- Can be integrated with your existing Web-based learning system(s). Supporting the Java Servlet 2.4 API or later. Test Servlets have been tested in JRun, Resin, and Apache/Tomcat implementations. Servlets and Java Server Pages (JSPs), are supported by an increasing number of ISPs (Internet Service Providers).

## System Requirements

### Hardware Requirements (minimum)

32 MB RAM (256MB recommended)

6 MB hard disk space (20 MB recommended)

### Software Requirements

Java Web Server supporting Java Servlet Specification 2.4 or later from Sun.

System running Windows 98, NT, 2000, XP

Internet Explorer, Firefox, or Netscape Communicator

Java Runtime Environment (JRE) Version 1.2 or later.

## Test Servlets Implementation Strategy

The testing and assessment methodology of *Test Servlets* is composed of three (3) parts. The component parts are:

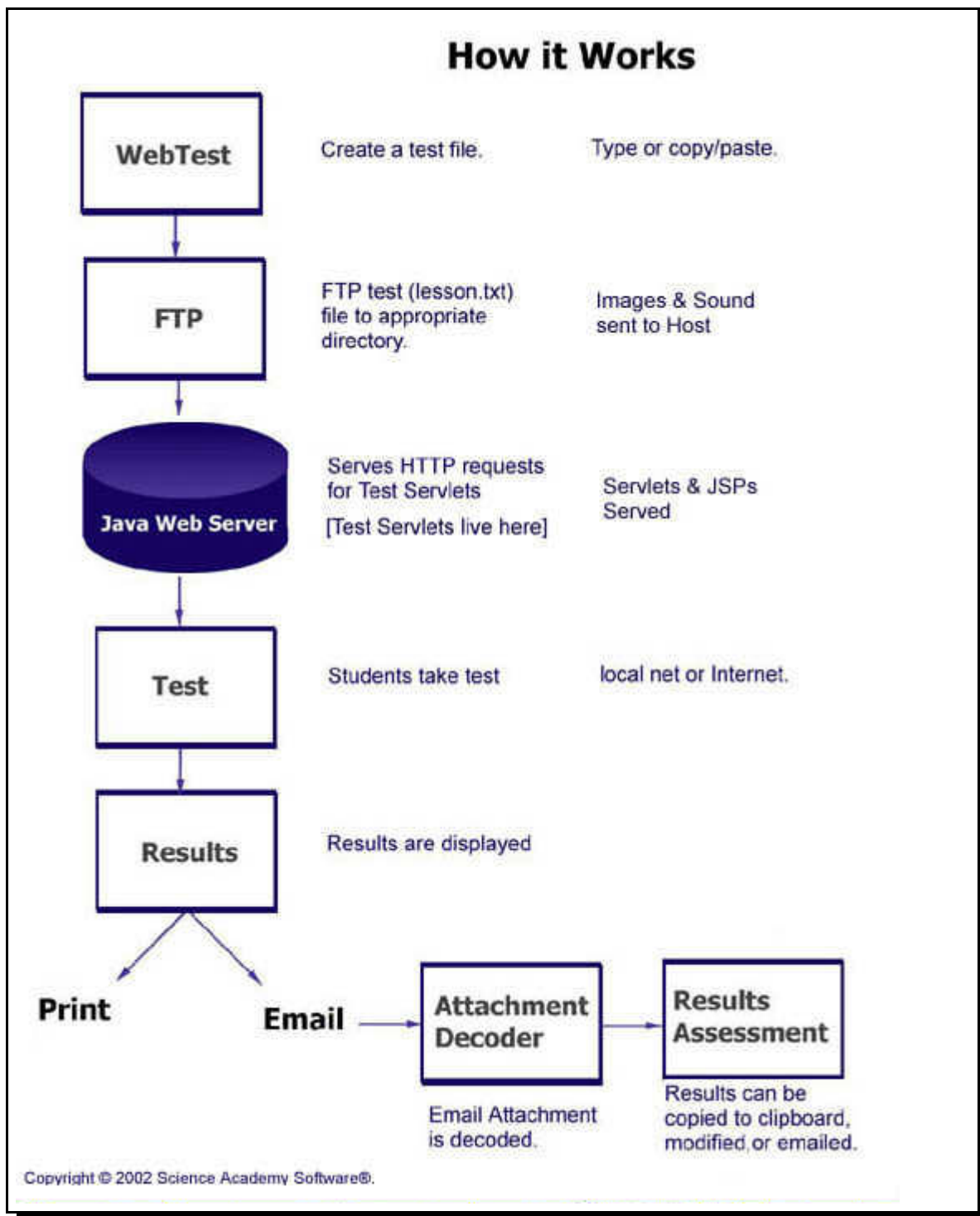
- *WebTest* - a desktop application for authoring Fill-In, True/False, and Multiple Choice tests. See *WebTest Manual*.
- *Test Servlets* - servlet based programs that handle the test presentation, session management, assessment, email delivery. *Test Servlets* reside on a Java Web server. This manual focuses on *Test Servlet* implementation.
- *Decoder* - a small application for decoding email attachments (results that are emailed from students). Runs on client. See *Decoder* documentation.

**How Test Servlets Work** - See "How it Works" diagram

Tests are created using *WebTest*. *WebTest* is a text formatting tool that creates a test file (identified as *lessonmf.txt*, *lessonmc.txt*, or *lessonmf.txt*) and test folders. Test folders serve to encapsulate the text of test (.txt), images (.jpg), and sound (.au, .wav, .mp3) which play on IE4 browsers or later.

Note: Sound files will not play in Netscape browsers. Sounds can be converted to .au, .wav, or .mp3 using *GoldWave* or other sound utility.

After tests are created, the test folder and its contents are uploaded to the host server via FTP (File Transfer Protocol). There are a variety of FTP programs available that can transfer files from your client to server.



When a user (student) takes a test by requesting the servlet URL, the *Test Servlets* on the server creates a test and session. *Test Servlets* are test engines. Servlets can be called by HTML or JSP's (Java Server Pages). The HTML, or JSP, may contain parameters that specify the test, its location, and functionality.

At the conclusion of the test, results are immediately displayed. Results can be printed, or emailed from students and sent to the teacher or test administrator. Results can be sent as an encoded attachment to emails and are not subject to alteration. The attachment can be decoded to a printable form buy the teacher or administrator by using *Decoder*.

## **Installing to Your Computer**

Test Servlets work in an environment that already supports java servlets; in other words, you are already running servlets or JSPs or are planning to by integrating Apache Tomcat to your Web server.

Test Servlets are distributed as a zip file. Assuming you have backed up your server, you would extract the files at your server root, or be safe by expanding the zip file in an empty directory, then copy (FTP) to your existing server, or adapt to your server architecture. Re-start your server.

Execute the **index.html** file; this launches the *Test Servlets* information pages and demo.

**NOTICE:** Don't forget to re-start your server, if applicable.

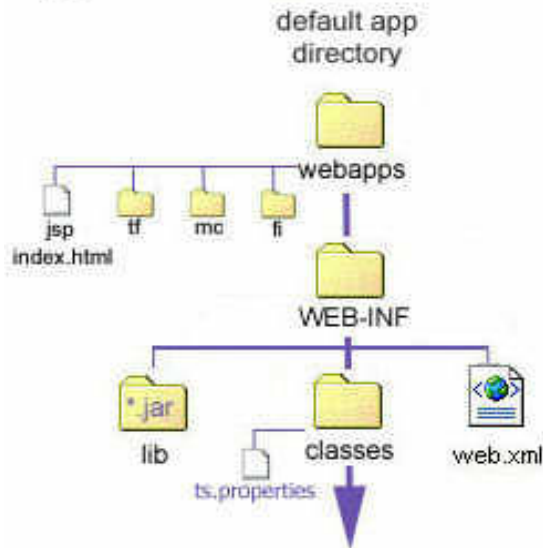
## Technical Background Information

Servlets are Java Web programs that generate dynamic content (webpages). The Servlet 2.4 Specification requires JRE 1.2 (Java Runtime Environment) or higher.

Java Server Pages (JSPs) are an extension of the Java Servlet API. They combine Java and HTML to create dynamic content.

The Directory Structure: According to the servlet specification, a container holding all the components of a Web application is the directory structure in which it exists. The existence of this directory structure is paramount to implementing *Test Servlets* on your Java Web Server.

### Typical Test Servlet Architecture



When installing Test Servlets on your server, you will need to copy (FTP) files to your server's /ROOT or /default directory, or the /WEB-INF directory.

An example of a server's /ROOT, using Tomcat, would be /Apache Software Foundation/Tomcat 5.5/webapps. All JSP and HTML files are stored here.

The following directories should exist on your server (using /LOCALHOST for example).

/LOCALHOST/WEB-INF This directory contains all resources related to the application that are not in the document root of the application. This is where your Web application deployment descriptor (WEB.XML) is located. Note that the WEB-INF directory is not part of the public document. No files contained in this directory can be served directly to a client.

/LOCALHOST/WEB-INF/classes. This directory is where servlet and utility classes are located.

/LOCALHOST/WEB-INF/lib. This directory contains Java archive (.jar) files that the web application depends upon.

/LOCALHOST/ft - the default test folder/directory for Fill-In questions

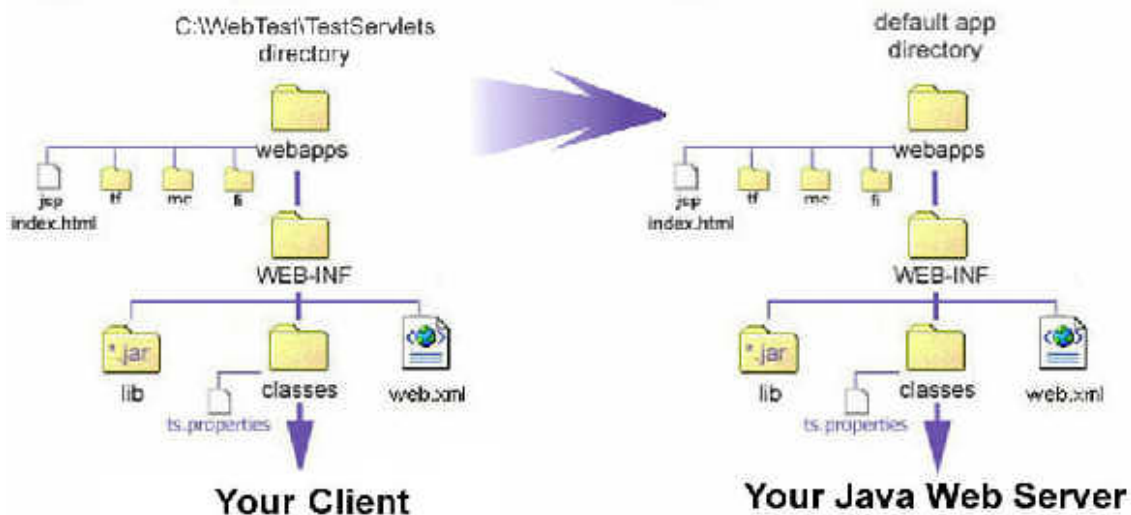
/LOCALHOST/mc - the default test folder/directory for Multiple Choice questions

/LOCALHOST/ft - the default test folder/directory for True/False questions

## Installing Test Servlets to your Server

Test Servlets are to reside on your Java Web Server/Host. After you have unpacked/unzipped the software on your local computer, you will need to copy, via FTP (File Transfer Protocol), from the associated directories/folders and their contents on your local computer(client) to your Web Server host.

## Copying directories/folders and files to host via FTP



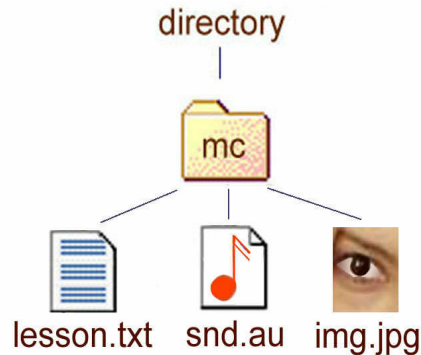
Within the /WEB-INF directory, the contents of the “classes” folder/directory are to be placed in your “classes” folder/directory. The contents of the “lib” folder/directory, are to be placed in your “lib” folder/directory. The web.xml file in the /WEB-INF folder/directory, are to be placed in your /WEB-INF folder/directory (see illustration).

A web.xml file has been provided; however, you may wish to create or modify an existing one to support *Test Servlets*.



## Packaging Tests for Delivery

A test is packaged as a directory/folder containing a test (text) file (e.g. lesson.txt), background images (.jpg), and audio files (.au, .wav, .mp3). See WebTest documentation for information on creating a test.



### Background Images

The background is in itself the image. Any .jpg image can be used for a background. You may wish to use a photo editor to layout images appropriately. Background images are named in sequential order from 1 to 20. For example, “bkgnd1.jpg” for the first question, “bkgnd2.jpg” is for the second, ..”bkgnd20.jpg” for the twentieth question.

**Note:** bkgnd.jpg - is the default background of all your tests. If no background image is associated with a particular question, this default background image would be displayed by *Test Servlets*.

### Audio

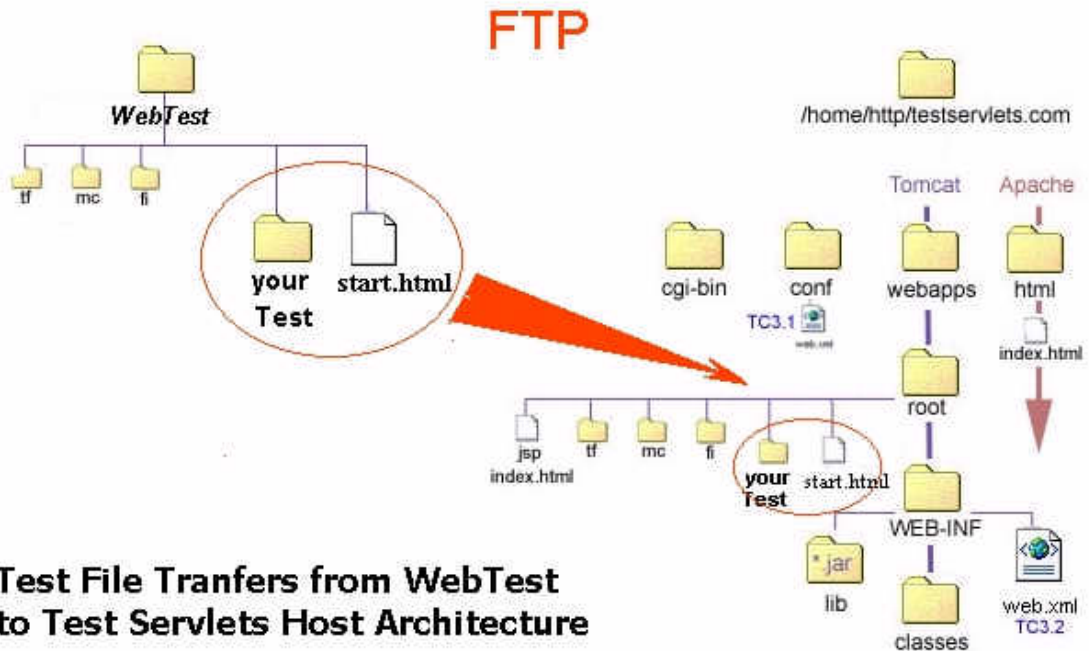
Sound files will play with all tests on IE4.0 or later. To add sound to a test, name your sound image “snd1.au”, “snd1.wav”, or “snd1.mp3” where 1 is the first question in the test. Sound files also follow sequential ordering.

The snd.au is the sound that is presented on the first screen requesting the students name. This is useful for conveying test instructions other information or music .

To obtain audio for test at a time, use a file named snd0.au, snd0.wav, or snd0.mp3.

**Note:** Use the same sound file type for all sounds in a test. Mixed sound types are not supported.

## FTP Test Folder & Files



### Test File Transfers from WebTest to Test Servlets Host Architecture

*WebTest* creates a test folder which contains the contents of your test and creates the **start.html** file which invokes the proper servlet and test parameters. The test folder and **start.html** file should be transferred to your Java Web server root as shown above. After these files have been transferred (FTP), running the **start.html** will invoke the test and establish a session for the user taking the test.

## Servlet Types

There are six (8) basic servlet “families” and entry points; a family is a collection of servlets that work closely together.

Name	Function	Type
fi	fill-in	Question at a time
tf	true or false	Question at a time
mc	multiple choice	Question at a time
fi2	fill-in	Test at a time
tf2	true or false	Test at a time
mc2	multiple choice	Test at a time
mc2x	multiple choice	Test at a time - randomized (browser refresh)
mcx	multiple choice	Test at a time - survey

Each of these servlets are engines; programs that spawn instances of a test session. The servlets handle the presentation and session management. The servlet path is used in the URL. Instructions are passed to servlets with the aid of parameters.

*WebTest*, you may recall, can create a **start.html** file. This file contains the HTML needed to execute the servlet. The servlet calling URL can be modified using a text editor to suit the location of your test folder and file.

For example, the following URL would be used for a fill-in test, whose test file is *lessonfi.txt*, which presents questions one at a time, and that are located in the */pilot* directory.

test type directory  
↓ ↓  
<http://127.0.0.1:8080/fi?thefile=lessonfi.txt&dir=pilot>  
↑ ↑  
default server address test file name

In *Tomcat*, for example, this is a URL that calls the localhost:8080. It is also a fill-in type test that uses the test file *lessonfi.txt* that is contained in the */pilot* directory/folder. HTML or JSP invokes the servlet to get the test based on the parameters that describe the name and location of the test file. The **start.html** file contains the information (parameters) for running the test.

NOTE: The **filename** (test file) and **dir** (directory/folder) are user defined. If not specified by user, defaults will be used. *WebTest* creates the folders and test file and saves it in the *C:/WebTest* directory.

## The Emailme Test Servlet

The Emailme sends the results as an attachment to an email to the teacher/test administrator. Users who have a default mail client (i.e. Outlook Express) are able to email their results. This servlet sends results to the email address defined in the `tts.properties` file and transfers execution to the **redirect.html** file. You can easily modify the code to redirect to any page you wish.

Note: Attachments to emails are encoded and are not subject to alteration. These attachments can be decoded using Decoder. Decoder decodes and presents test results for viewing, editing, or further distribution. See Decoder documentation for more details.

## Integrating into Web-based Learning Systems

After test results have been displayed, users can be redirected to the Websites root or any Web page. The **redirect.html** file at the servers root is the default redirection. However, if a **redirect.html** page is placed in the test folder, the servlet will execute this page upon clicking the button on the **Results** page. This allows the testing capability to be seamlessly integrated in most Web-based learning systems.

## Personalizing Test Servlets

The **tts.properties** file contains global data that applies to all test servlets. To add your logo, URL, and recipient of emailed test results you will have to edit this file. The `tts.properties` file is a text file containing name-value pairs.

This file contains the following:

```
#This is a resource properties file
theURL=http://www.scienceacademy.com
TheImage=url.jpg
email=support@scienceacademy.com
serialnumber=TS1.91022802003RC
```

The text in this file can be easily modified in Notepad or other text processor. You may wish to change:

- theURL** - your website's URL
- theImage** - an image 16 x 160 jpg image
- email** - the email where test results are to be sent.
- serialnumber** - **WARNING! DO NOT TOUCH or MODIFY**

When editing the `tts.properties` file, make sure that you place this file back where you got it in the `/classes` directory or folder.

## References for further reading:

### Books:

*Java Servlet Programming*, Jason Hunter with William Crawford 2nd Edition  
O'Reilly & Associates

*The Java Developers Almanac 2000*, Patrick Chan, Addison-Wesley

*Java in a Nutshell*, David Flanagan, O'Reilly & Associates

*Developing Applications with JRun*, Allaire Corporation

### Sites:

Sun Microsystems, Inc - <http://java.sun.com>

Servlets.com <http://www.servlets.com>

Apache Software Foundation <http://www.apache.org>

Jguru.com <http://www.jguru.com>

C/Net Download.com <http://www.download.com>

GoldWave, Inc. <http://www.goldwave.com>

Netscape Developer Connection - <http://developer.netscape.com>

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## Troubleshooting and Product Support

*Test Servlets* have been in service over three years. We do our best to make sure it works the first and every time but we are not infallible. If servlets crash, note the error descriptions generated at your system console or server logs. In most cases, it can probably be fixed by re-starting the server. However, if you think there's a bug in the program, we would like to know about it. Try to be as detailed as you can in describing the problem. If we fix it, or have a fix for it, we would gladly share that with you.

Email support is provided by emailing:

[help@scienceacademy.com](mailto:help@scienceacademy.com)

Visit our *Test Servlet* support page for the latest information at:

<http://www.scienceacademy.com/testservlets/support>

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600 Baychester Avenue, Suite 5B  
Bronx, NY 10475  
USA