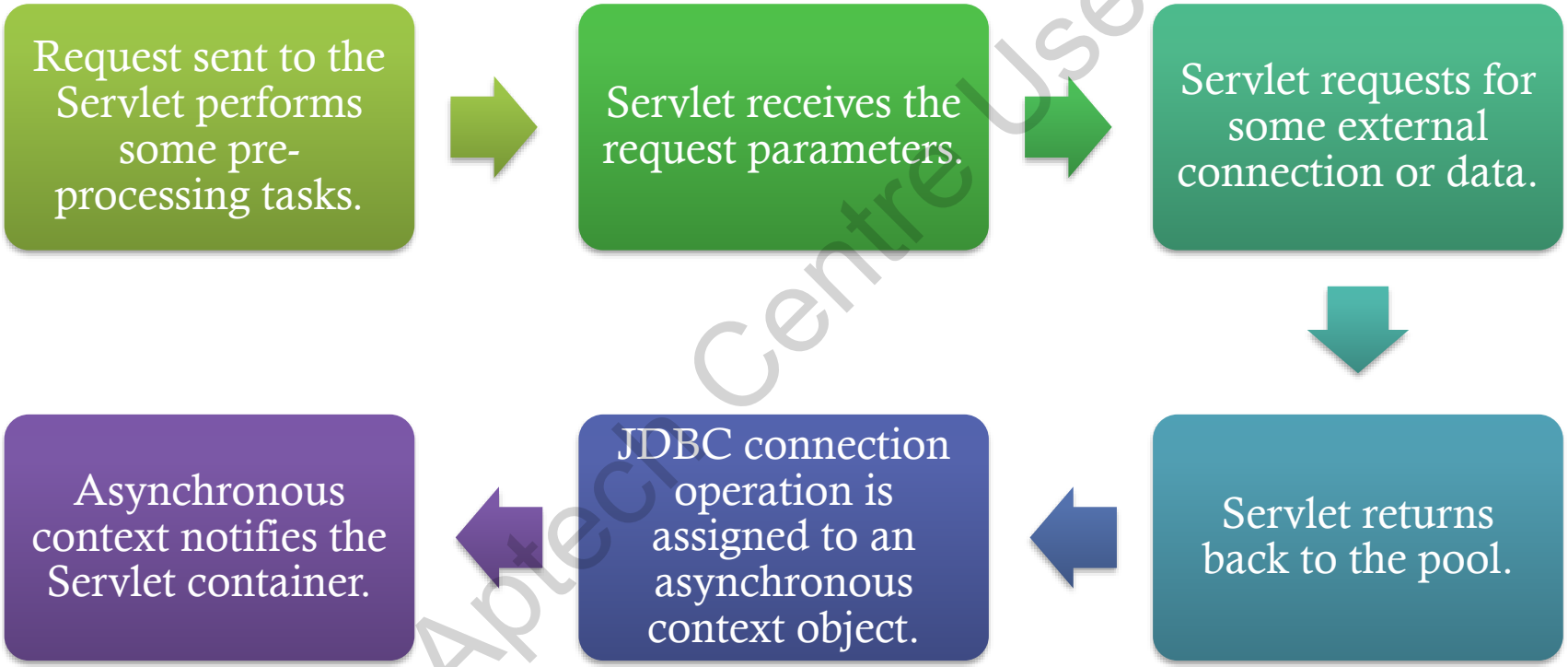
Session: 9

Asynchronous Servlet Communication

Objectives

- Explain the necessity for Asynchronous Servlet
- Describe advantages and use of Asynchronous servlet
- Explain how to create Asynchronous Servlet and Asynchronous Listener
- Describe the concept of server push mechanism
- Explain how to create an asynchronous JavaScript client using XMLHttpRequest object
- Explain the necessity of non-blocking I/O support in Servlet
- Explain how to implement non-blocking I/O in asynchronous Servlet
- Explain the necessity for protocol upgrade
- Explain the process of protocol upgrade in a Servlet
- Describe the process of using Asynchronous Servlets for Web Push Notifications (Server push)

Introduction



Handling Asynchronous Servlet

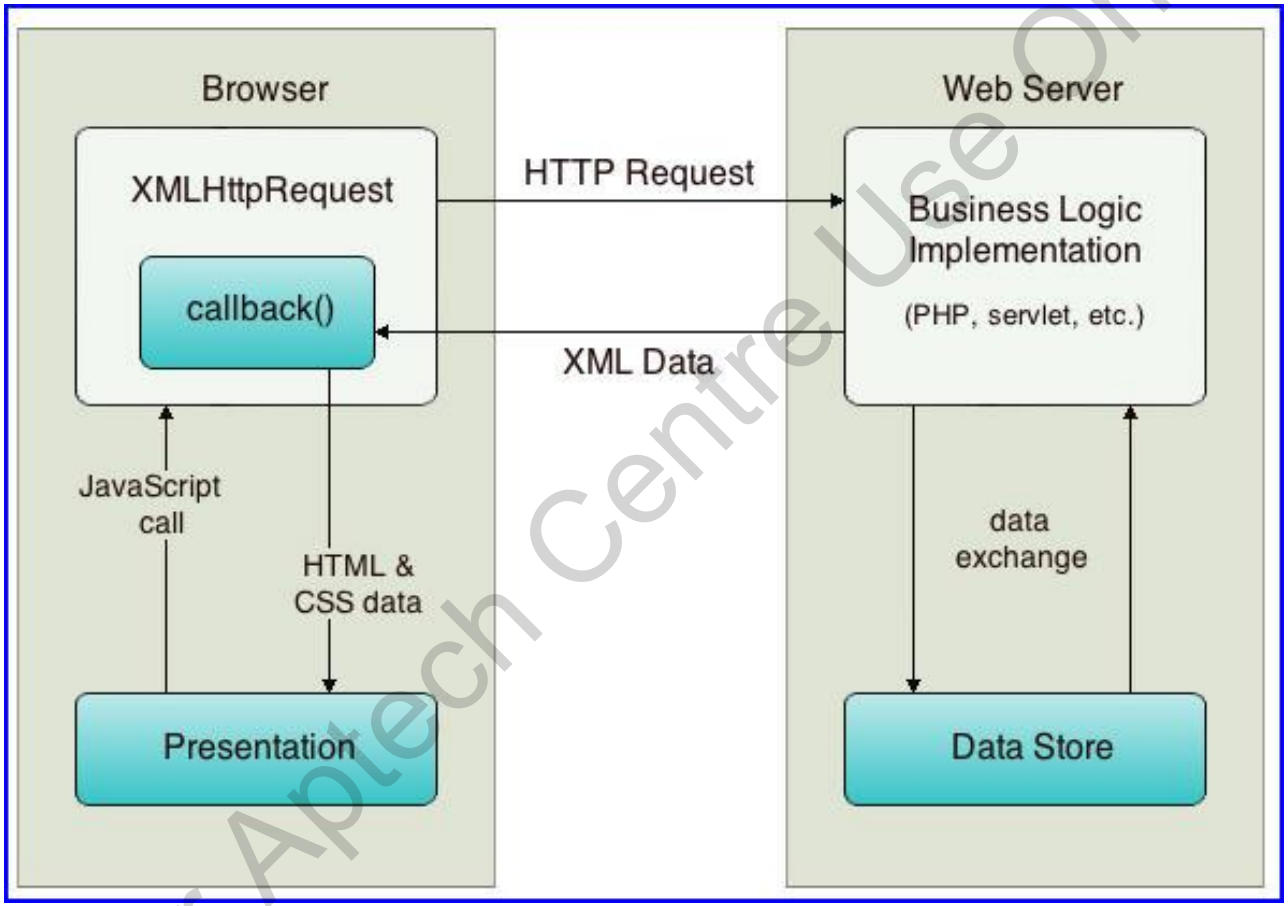
AsyncContext Class

- `void start(Runnable run)`
- `ServletRequest getRequest()`
- `ServletResponse getResponse()`
- `void complete()`
- `void dispatch(String path)`

AsyncListener Interface

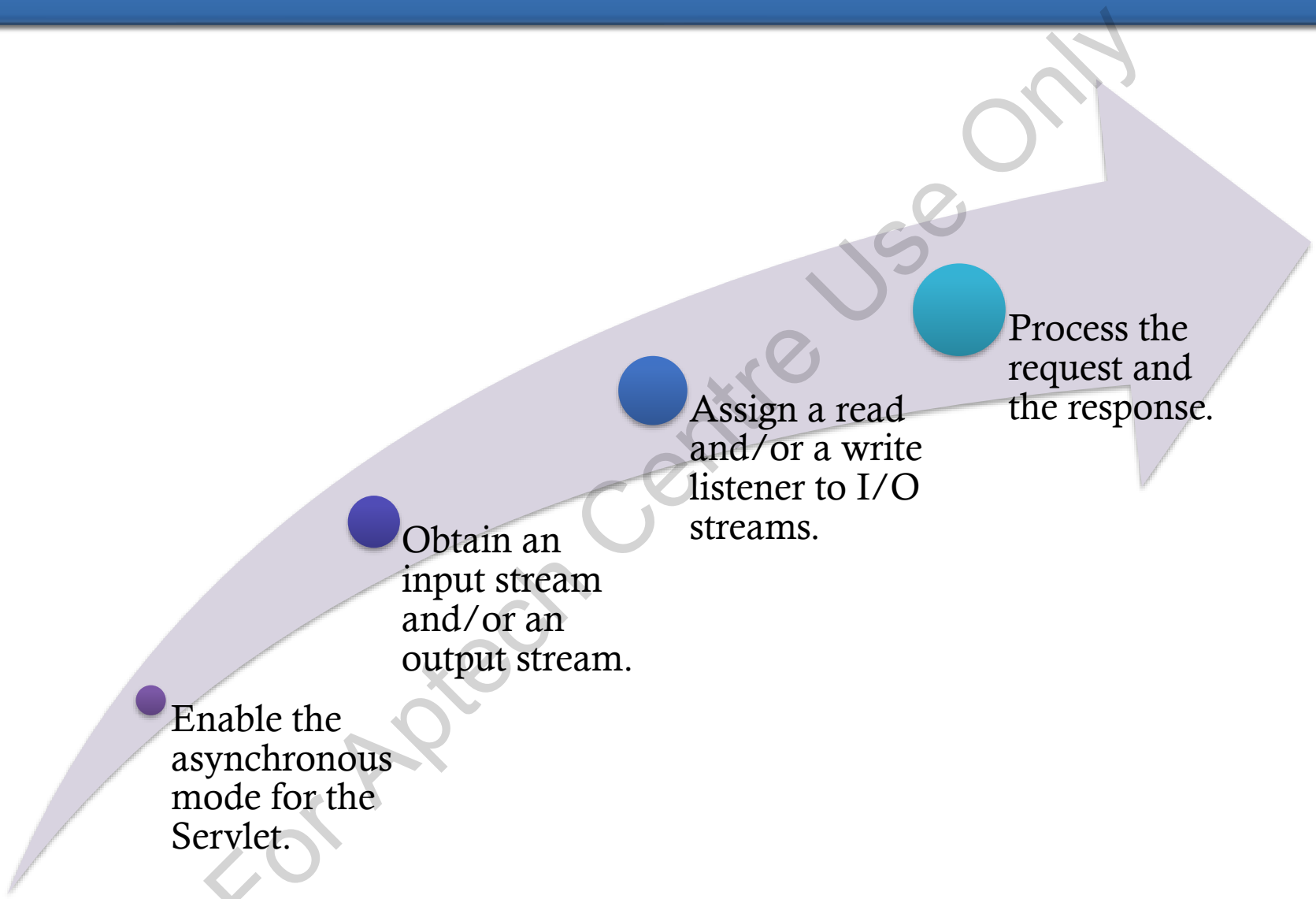
- `void onStartAsync (AsyncEvent event)`
- `void onComplete (AsyncEvent event)`
- `void onError (AsyncEvent event)`
- `void onTimeout (AsyncEvent event)`

Server Push Mechanism in Servlet



Asynchronous Communication in Web Application

Non-Blocking Input/Output in Servlet



Protocol Upgrade Processing

Actions of Push notification mechanism

- Server signs an authorization header.
- Server delivers the message to the destination URL given.
- Push server decrypts the authentication header.
- Push server delivers the message to the browser.

Summary(1-2)

- The architecture of the Servlet is based on multithreaded model. In this model, the Web container normally creates a pool of threads ready to serve the client with the Servlet instance.
- The Java Servlet API provides asynchronous processing support for servlets and filters in Web applications.
- In asynchronous processing, a Servlet thread waiting for a resource is released by the container and returned to the pool.
- The class jakarta.servlet.AsyncContext is used to process the request asynchronously within the Servlet.
- To handle these events, the AsyncContext object can be registered with the AsyncListener interface.
- The mechanism of sending the data asynchronously from the Web server to the client without redrawing the whole page, is referred as server push.

Summary(2-2)

- One of the most popular programming approach used in modern Web applications to push the server data to the client is performed using AJAX mechanism.
- The AJAX mechanism works with an XMLHttpRequest object that is used to pass the requests and responses asynchronously between the client and server.
- Servlet API provides non-blocking I/O support for Servlets and filters to process input and output asynchronously in the request.
- With Servlet 3.0 API, the HTTP protocol has been upgraded from HTTP 1.0 to HTTP 1.1. HTTP 1.0 was a stateless protocol, whereas HTTP 1.1 can persist the connection between the client and the server.
- Web push notifications are alerts sent to a user device whenever their browser is open.