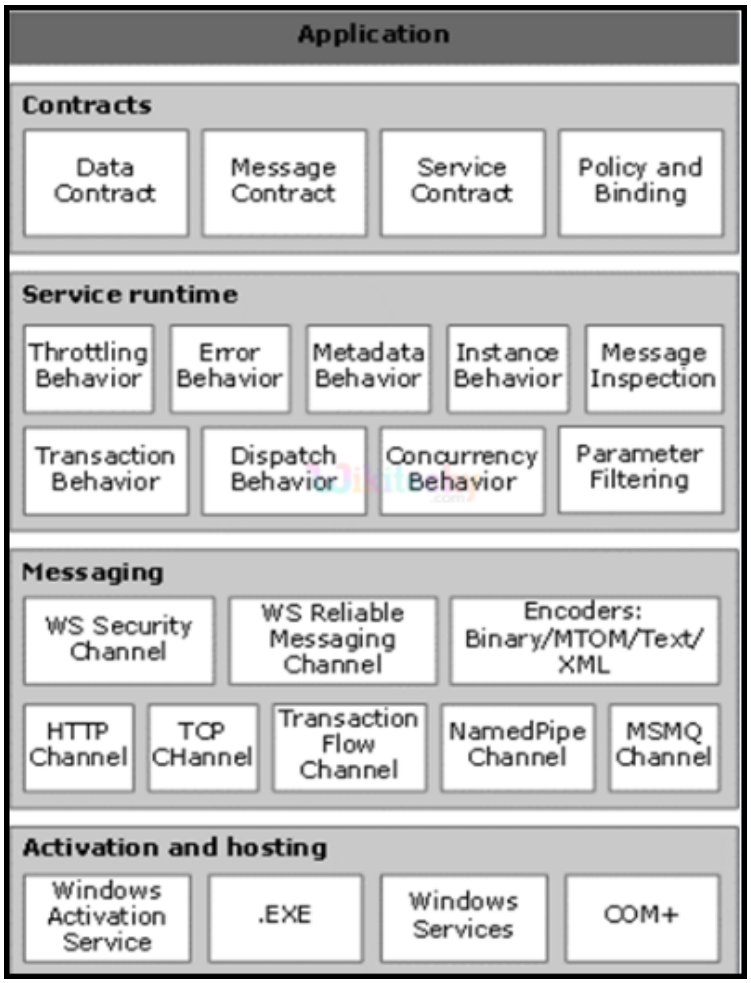
WCF - Architecture

- WCF contains a layered architecture with support for the distributed application development.
- The architecture has four major layers such as **Contracts, Service runtime, Messaging, Activation and Hosting.**
- The above diagram depicts an inner view of each layer.



WCF Architecture

Contracts:

- **Contracts layer** stay close to the application and hence developers directly communicate with this layer.
- Hence its duty is to define the service in detail and delegate access methodologies to acquire the service.
- The features of contracts layer includes:

1. Data Contract:

- Data Contract describes the **message parameter** (ie.) the data passed to and received from the service.
- These parameters are well-defined by **XML Schema definition language (XSD) documents.**
- This enables any system, that understands the XML and to process the documents.

2. Message Contract:

- Message Contract defined as the parts of using **SOAP message format.**
- It is used to control these message parts during the interoperability process.

3. Service Contract:

- Service Contract clarifies more on the method definitions of the service.
- It is available in the form of interface defined by **Visual Basic or Visual C#** and provide details on service endpoints for easy communication with the service.

4. Policies and Bindings:

- It informs about the conditions that needs to be followed for communicating with a service.
- It comprises of security measures needed for establishing communication.

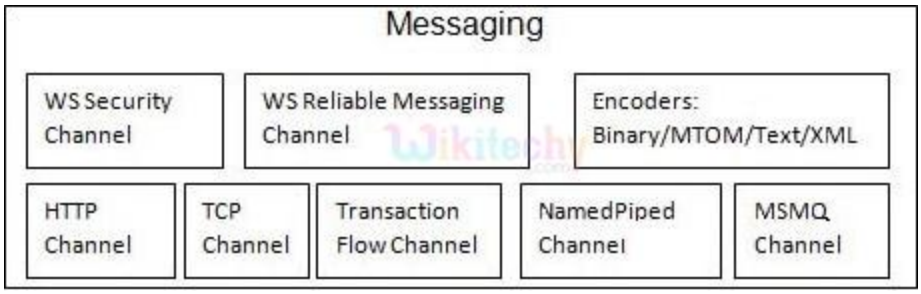
5. Service Runtime:

Service runtime layer defines the service behaviors during its actual operation. Some of them are listed as follows:

- **Throttling** takes care on the number of messages to be processed at a time. The count varies with the demand for the service.
- An **error behavior** outputs an internal error on the service, to the client.
- **Metadata** concerns much about the metadata's availability to the client.

- **Instance behavior** decides on the number of instances of the service at a particular time.
- **Transaction behavior** takes care of rolling back a process to its previous state in case of failures.
- **Dispatch behavior** insist more on the processing of message by the WCF architecture
- **Concurrency Behavior** selects the method for switch over mechanism via the threading process.
- **Parameter Filtering** filters the message headers and completes the preset actions with the filters as base.

6. Messaging:



Channel Stack in WCF messaging

- Message contains a set of channels termed as channel stack and to process the upcoming messages.
- Two types of channels are as follows.

  - **Transport Channels –**

    - Available at the bottom of the stack.
    - Communicate messages with the network via HTTP, named pipes, TCP, and MSMQ.

- Use encoder schemes such as XML and optimized binary.

➢ **Protocol Channels –**

- Present at the top of channel stack.
- Process message header via protocols such as WS-Security and WS-Reliability.

7. Activation and Hosting:

Services are hosted or executed for the client's usage. The activation and hosting mechanisms:

- **IIS:**

  IIS(Internet information Service) automatically activates the service code in case of a service using **Http Protocol.**

- **Windows Activation Service:**

  - **WAS** is the process activation tool that is available as part of IIS 7.0.
  - It is used to provide message-based activation on protocols such as **TCP and named pipes**.

- **Self-Hosting:**

  A WCF service is made to be self-hosted either as a console application or a Windows Application or as a WPF application.

Windows Service:

WCF can be hosted as a Windows Service, and controlled by the **Service Control Manager (SCM).**

