
Apache ShenYu document

Apache ShenYu

Aug 23, 2021

1	What is the Apache ShenYu?	1
2	Features	2
3	Architecture Diagram	3
4	Mind maps	4
5	Modules	5
6	About	6
7	Design	7
7.1	Apache ShenYu Admin Database Design	7
7.1.1	Plugin, Selector And Rule	7
7.1.2	Resource Permission	8
7.1.3	Data Permissin	9
7.1.4	Meta Data	10
7.1.5	Dictionary Management	11
7.2	Data Synchronization Design	11
7.2.1	Preface	11
7.2.2	Principle Analysis	12
	Zookeeper Synchronization	12
	WebSocket Synchronization	14
	Http Long Polling	14
	Nacos Synchronization	15
	Etdc Synchronization	15
	Consul Synchronization	15
7.3	Application Client Access	16
7.3.1	Design principle	16
	Client	16
	Server	18
7.3.2	Http Registry	19

7.3.3	Zookeeper Registry	19
7.3.4	Etd Registry	20
7.3.5	Consul Registry	20
7.3.6	Nacos Register	21
7.3.7	SPI	22
7.4	Flow Control	22
7.4.1	Plugin	22
7.4.2	Selector And Rule	23
7.5	SPI Design	23
7.5.1	Registry Center	23
7.5.2	Metrics Center	23
7.5.3	Load Balance	23
7.5.4	RateLimiter	24
7.5.5	Match Strategy	24
7.5.6	Parameter Data	24
7.5.7	Predicate Judge	24
8	Deployment	25
8.1	Local Deployment	25
8.1.1	Environmental preparation	25
8.1.2	Download the compiled code	25
8.2	Binary Packages Deployment	26
8.2.1	Start Apache ShenYu Admin	26
8.2.2	Start Apache ShenYu Bootstrap	26
8.3	Docker Deployment	26
8.3.1	Start Apache ShenYu Admin	27
8.3.2	Start Apache ShenYu Bootstrap	27
8.4	k8s Deployment	27
8.5	Helm Deployment	27
8.6	Custom Deployment	28
8.6.1	Start Apache ShenYu Admin	28
8.6.2	Build your own gateway (recommended)	28
9	Quick Start	30
9.1	Quick start with Http	30
9.1.1	Environment to prepare	30
9.1.2	Run the shenyu-examples-http project	31
9.1.3	Test	31
9.2	Quick start with Dubbo	32
9.2.1	Environment to prepare	32
9.2.2	Run the shenyu-examples-dubbo project	34
9.2.3	Test	36
9.3	Quick start with Spring Cloud	38
9.3.1	Environment to prepare	38
9.3.2	Run the shenyu-examples-springcloud project	39

9.3.3	Test	42
9.4	Quick start with Sofa	42
9.4.1	Environment to prepare	42
9.4.2	Run the shenyu-examples-sofa project	43
9.4.3	Test	47
9.5	Quick start with gRPC	48
9.5.1	Prepare For Environment	48
9.5.2	Run the shenyu-examples-grpc project	49
9.5.3	Test	50
9.5.4	Streaming	51
9.6	Quick start with Tars	55
9.6.1	Environment to prepare	55
9.6.2	Run the shenyu-examples-tars project	56
9.6.3	Test	58
9.7	Quick start with Motan	59
9.7.1	Environment to prepare	59
9.7.2	Run the shenyu-examples-motan project	60
9.7.3	Test	61
10	User Guide	62
10.1	Data Synchronization Config	62
10.1.1	WebSocket Synchronization Config (default strategy, recommend)	62
10.1.2	Zookeeper Synchronization Config	63
10.1.3	HTTP Long Polling Synchronization Config	64
10.1.4	Nacos Synchronization Config	64
10.1.5	Etcd Synchronization Config	65
10.1.6	Consul Synchronization Config	66
10.2	Application Client Access Config	67
10.2.1	Http Registry Config	67
	shenyu-admin config	67
	shenyu-client config	68
10.2.2	Zookeeper Registry Config	68
	shenyu-admin config	68
	shenyu-client config	69
10.2.3	Etcd Registry Config	69
	shenyu-admin config	69
	shenyu-client config	70
10.2.4	Consul Registry Config	71
	shenyu-admin config	71
	shenyu-client config	72
10.2.5	Nacos Registry Config	73
	shenyu-admin config	73
	shenyu-client config	73
10.3	Http Proxy	74
10.3.1	Add divide plugin in gateway	75

10.3.2	Http request access gateway (for springMvc)	75
10.3.3	Http request access gateway(other framework)	77
10.3.4	User request	77
10.4	Dubbo Proxy	78
10.4.1	Add dubbo plugin in gateway	78
10.4.2	Dubbo service access gateway	80
10.4.3	Dubbo configuration	81
	Configure the interface with gateway	82
	Dubbo user request and parameter explanation.	82
10.4.4	Service governance	83
10.4.5	Http -> Gateway -> Dubbo Provider	85
10.5	Spring Cloud Proxy	85
10.5.1	Add springcloud plugin in gateway	86
10.5.2	SpringCloud service access gateway	87
10.5.3	User Request	89
10.6	Sofa Proxy	90
10.6.1	Add sofa plugin in gateway	90
10.6.2	Sofa service access gateway	91
10.6.3	Plugin Settings	92
10.6.4	Interface registered to the gateway	92
10.6.5	User request and parameter description	92
10.7	gRPC Proxy	93
10.7.1	Add gRPC plugin in gateway	93
10.7.2	gRPC service access gateway	94
10.7.3	User Request	95
10.8	Tars Proxy	96
10.8.1	Add tars plugin in gateway	97
10.8.2	Tars service access gateway	97
10.8.3	User Request	98
10.9	Motan Proxy	98
10.9.1	Add motan plugin in gateway	98
10.9.2	Motan service access gateway	99
10.9.3	User Request	100
11	release-notes	101
11.1	2.3.0	101
11.1.1	soul-admin	101
11.1.2	soul-bootstrap	101
11.2	2.2.0	102
12	Download	103
12.1	Latest Releases	103
12.1.1	Apache ShenYu (incubating) - Version: 2.4.0 (Release Date: Aug 8, 2021)	103
12.2	Verify the Releases	103

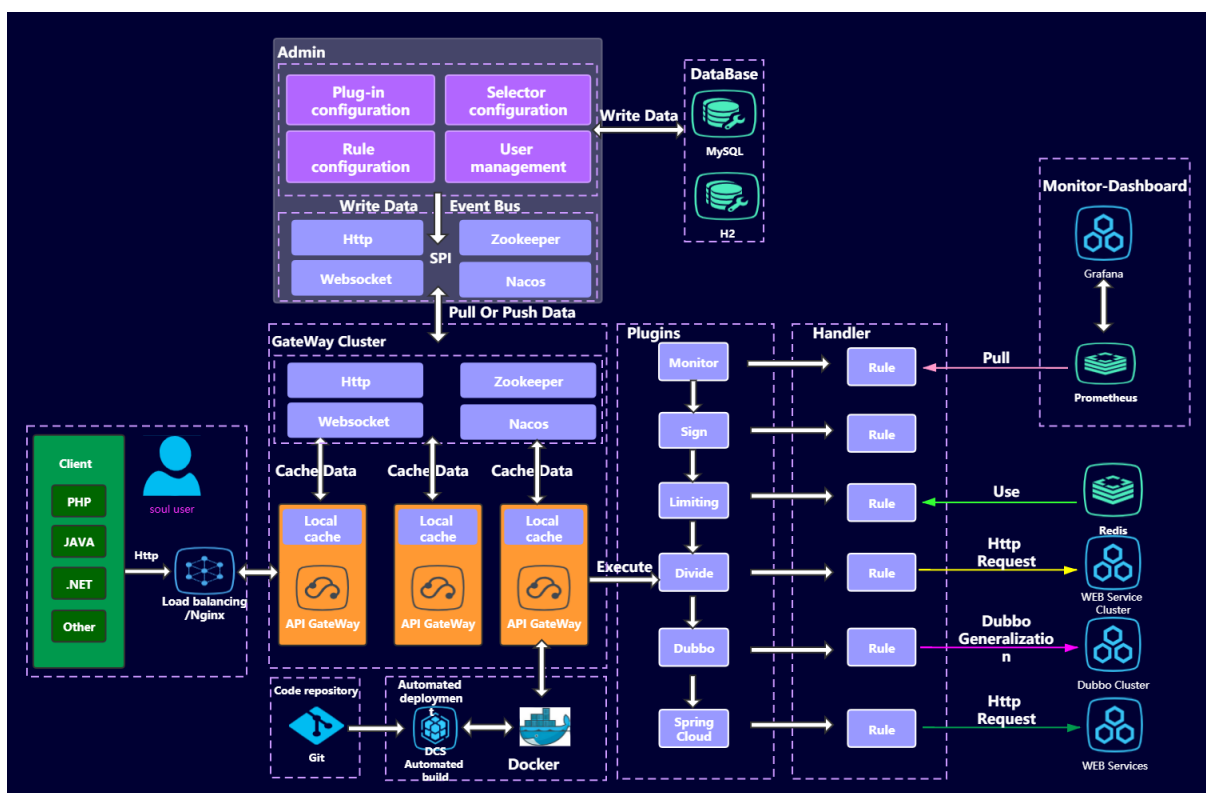
12.3 PDF	104
--------------------	-----

What is the Apache ShenYu?

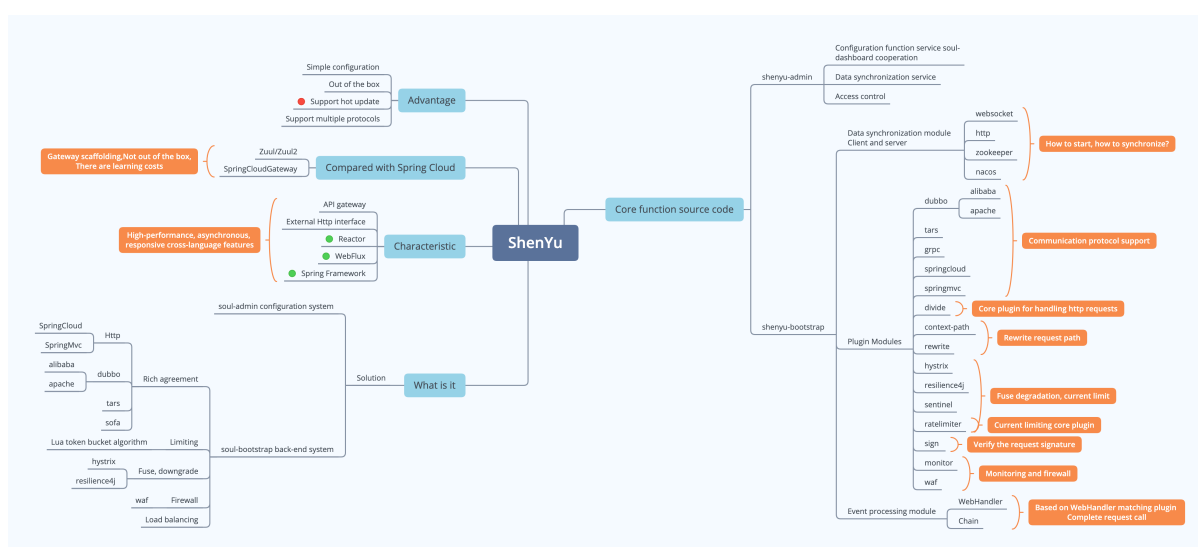
This is an asynchronous, high-performance, cross-language, responsive API gateway.

- Support various languages (http protocol), support Dubbo, Spring Cloud, gRPC, Motan, Sofa, Tars and other protocols.
- Plugin design idea, plugin hot swap, easy to expand.
- Flexible flow filtering to meet various flow control.
- Built-in rich plugin support, authentication, limiting, fuse, firewall, etc.
- Dynamic flow configuration, high performance.
- Support cluster deployment, A/B Test, blue-green release.

Architecture Diagram



Mind maps



- shenyu-admin : plugins and other configuration information management background
- shenyu-bootstrap : with the startup project, users can refer to
- shenyu-client : user fast access with Spring MVC, Dubbo, Spring Cloud.
- shenyu-common : framework common class
- shenyu-disruptor : based on disruptor Enclosure
- shenyu-register-center : rpc type register for shenyu-client
- shenyu-dist : build project
- shenyu-metrics : metrics impl by prometheus.
- shenyu-plugin : ShenYu provider plugin collection.
- shenyu-spi : ShenYu spi define.
- shenyu-spring-boot-starter : support for the spring boot starter
- shenyu-sync-data-center : provider ZooKeeper, HTTP, WebSocket, Nacos to sync data
- shenyu-examples : the RPC examples project
- shenyu-web : core processing packages including plugins, request routing and forwarding, and so on

Apache ShenYu has been used widely in more and more systems in many companies, and it's simple and convenient to integrate Services/APIs with the high performance and flexibility.

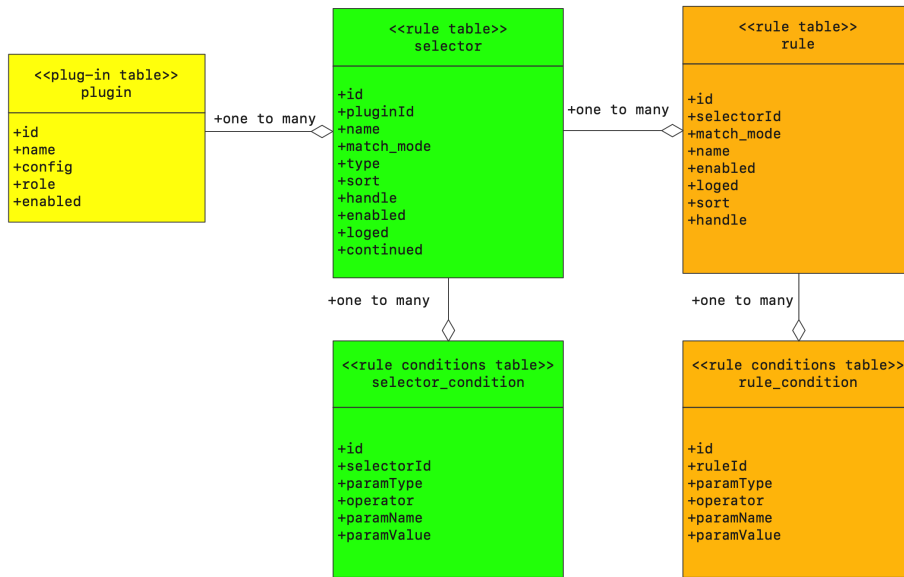
In double eleven online shopping carnival of China, ShenYu clusters successfully supported a large volume of internet business.

7.1 Apache ShenYu Admin Database Design

Apache Shenyu Admin is the management system of the gateway, which can manage all plugins, selectors and rules visually, set users, roles and resources.

7.1.1 Plugin, Selector And Rule

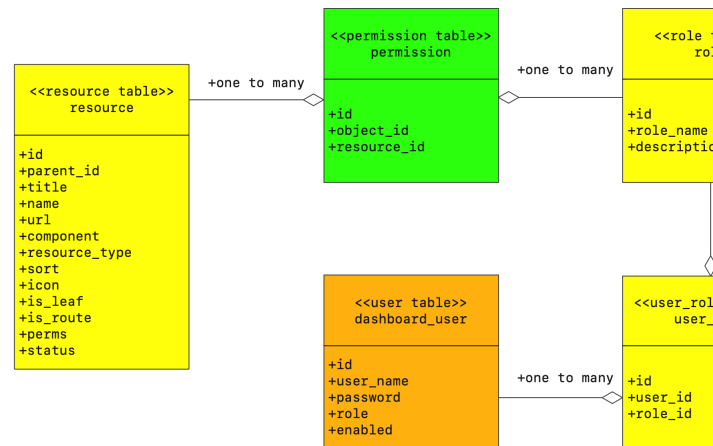
- Plugin: ShenYu uses the plugin design idea to realize the hot plug of the plugin, which is easy to expand. Built-in rich plugins, including RPC proxy, circuit breaker and current limiting, authority and certification, monitoring, and more.
- Selector: Each plugin can set multiple selectors to carry out preliminary filtering of traffic.
- Rule: Multiple rules can be set per selector for more fine-grained control of flow.
- The Database Table UML Diagram:



- Detailed design:
 - One plugin corresponds to multiple selectors,one selector corresponds to multiple rules.
 - One selector corresponds to multiple match conditions,one rule corresponds to multiple match conditions.
 - Each rule handles differently in corresponding plugin according to field handler,field handler is a kind of data of JSON string type.You can view detail during the use of shenyu-admin.

7.1.2 Resource Permission

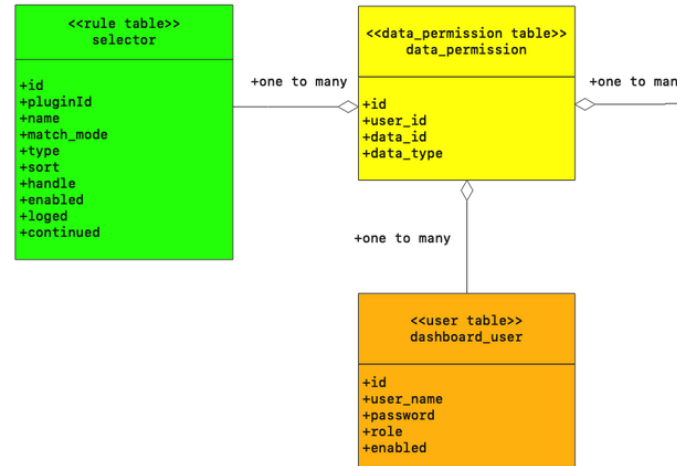
- The resource are the menus and buttons in the shenyu-admin console.
- Resource Permission use database to store user name,role,resource data and relationship.



- The Resource Permission Table UML Diagram:
- Detailed design:
 - one user corresponds to multiple role, one role corresponds to multiple resources.

7.1.3 Data Permission

- Data Permission use database to store the relationship between users, selectors and rules.



- The Data Permission Table UML Diagram:
- Detailed design:
 - The most important table is data_permission, where a user corresponds to multiple data permissions.
 - The field data_type distinguishes between different types of data, which corresponds to the following: 0 -> selector, 1 -> rule.
 - The field data_id holds the primary key id of the corresponding type.

7.1.4 Meta Data

- Metadata is used for generic invoke by gateway.
- For each interface method, there is one piece of metadata.
- The Database Table UML Diagram:
- Detailed design:
 - path: When the gateway is requested, a piece of data will be matched according to path, and then the subsequent process will be carried out.
 - rpc_ext: Used to hold extended information for the RPC proxy.

7.1.5 Dictionary Management

- Dictionary management is used to maintain and manage public data dictionaries.
- The Database Table UML Diagram:

7.2 Data Synchronization Design

This document explains the principle of data synchronization. Data synchronization refers to the strategy used to synchronize data to ShenYu gateway after shenyu-admin background operation data. ShenYu gateway currently supports ZooKeeper, WebSocket, HTTP Long Polling, Nacos, Etcd and Consul for data synchronization.

See [Data Synchronization Configuration](#) for configuration information about data synchronization.

7.2.1 Preface

Gateway is the entrance of request and it is a very important part in micro service architecture, therefore the importance of gateway high availability is self-evident. When we use gateway, we have to change configuration such as flow rule, route rule for satisfying business requirement. Therefore, the dynamic configuration of the gateway is an important factor to ensure the high availability of the gateway.

In the actual use of Apache ShenYu Gateway, users also feedback some problems:

- Apache ShenYu depends on ZooKeeper, how to use Etcd, Consul, Nacos and other registry center?
- Apache ShenYu depends on Redis and InfluxDB, and do not use limiting plugins or monitoring plugins. Why need these?
- Why not use configuration center for configuration synchronization?
- Why can't updates be configured dynamically?
- Every time you want to query the database, Redis is a better way.

According to the feedback of users, we have also partially reconstructed ShenYu. The current data synchronization features are as follows:

- All configuration is cached in ShenYu gateway memory, each request uses local cache, which is very fast.
- Users can modify any data in the background of shenyu-admin, and immediately synchronize to the gateway memory.
- Support ShenYu plugin, selector, rule data, metadata, signature data and other data synchronization.
- All plugin selectors and rules are configured dynamically and take effect immediately, no service restart required.
- Data synchronization mode supports Zookeeper, HTTP long polling, WebSocket, Nacos, Etcd and Consul.

7.2.2 Principle Analysis

The following figure shows the process of data synchronization of ShenYu. ShenYu Gateway will synchronize configuration data from configuration service at startup, and support push-pull mode to get configuration change information, and then update local cache. The administrator can change the user permissions, rules, plugins and traffic configuration in the admin system(shenyu-admin), and synchronize the change information to ShenYu Gateway through the push-pull mode. Whether the mode is push or pull depends on the synchronization mode used.

In the original version, the configuration service relied on the Zookeeper implementation to manage the back-end push of changes to the gateway. Now, WebSocket, HTTP long polling, ZooKeeper, Nacos, Etd, and Consul can now be supported by specifying the corresponding synchronization policy by setting `shenyu.sync.${strategy}` in the configuration file. The default Websocket synchronization policy can be used to achieve second level data synchronization. However, it is important to note that Apache ShenYu Gateway and shenyu-admin must use the same synchronization policy.

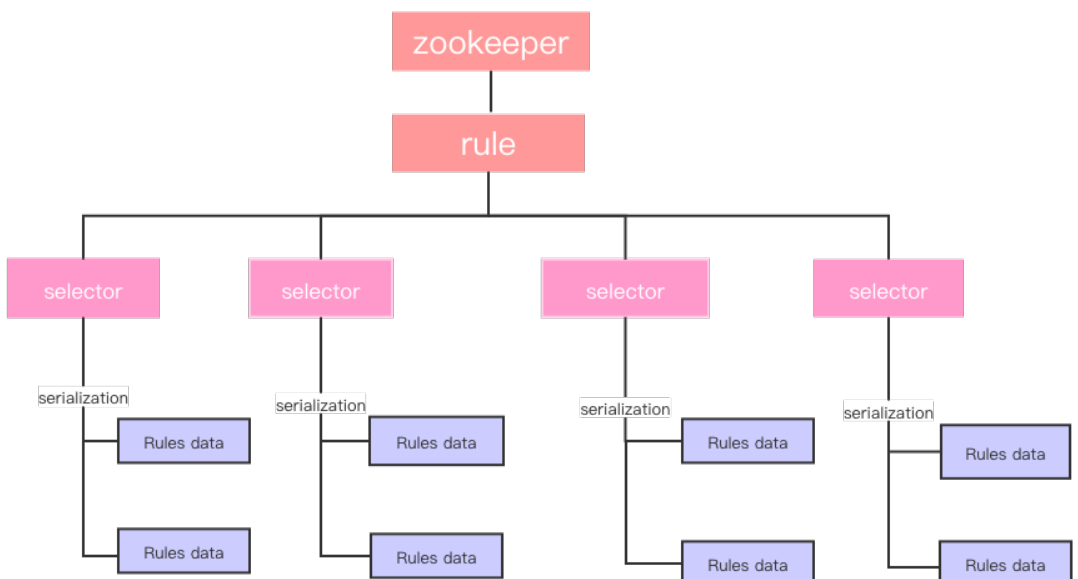
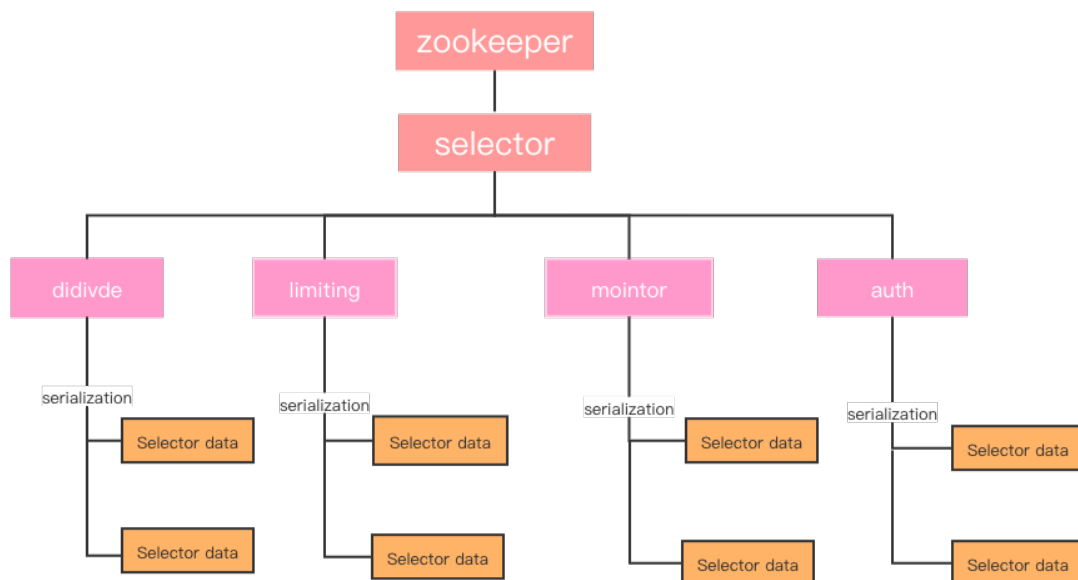
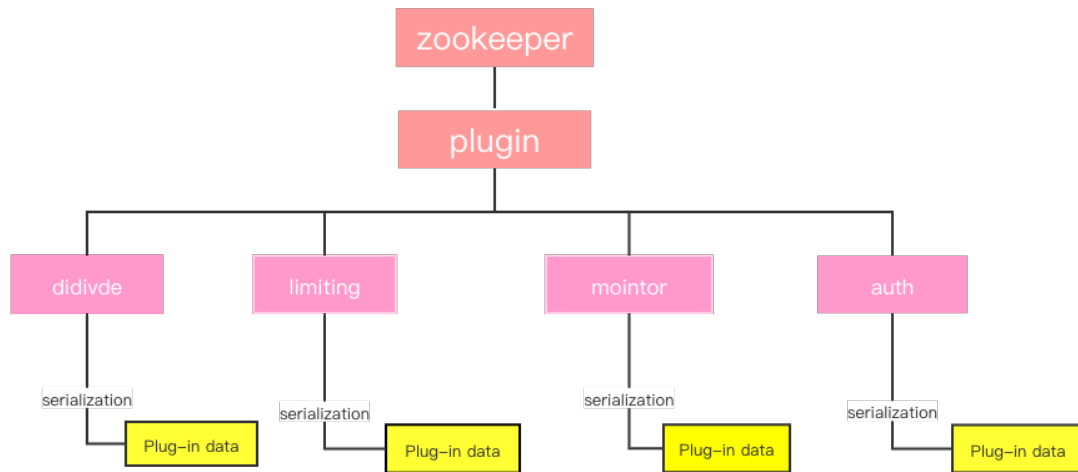
As showing picture below,shenyu-admin will issue a configuration change notification through `EventPublisher` after users change configuration,`EventDispatcher` will handle this modification and send configuration to corresponding event handler according to configured synchronization strategy.

- If it is a websocket synchronization strategy,it will push modified data to shenyu-web,and corresponding `WebsocketDataHandler` handler will handle shenyu-admin data push at the gateway layer
- If it is a zookeeper synchronization strategy,it will push modified data to zookeeper,and the `ZookeeperSyncCache` will monitor the data changes of zookeeper and process them
- If it is a http synchronization strategy,shenyu-web proactively initiates long polling requests,90 seconds timeout by default,if there is no modified data in shenyu-admin,http request will be blocked,if there is a data change, it will respond to the changed data information,if there is no data change after 60 seconds,then respond with empty data,gateway continue to make http request after getting response,this kind of request will repeat.

Zookeeper Synchronization

The zookeeper-based synchronization principle is very simple,it mainly depends on zookeeper watch mechanism,shenyu-web will monitor the configured node,when shenyu-admin starts,all the data will be written to zookeeper,it will incrementally update the nodes of zookeeper when data changes,at the same time, shenyu-web will monitor the node for configuration information, and update the local cache once the information changes

Apache ShenYu writes the configuration information to the zookeeper node,and it is meticulously designed. If you want to learn more about the code implementation, refer to the source code `ZookeeperSyncDataService`.



WebSocket Synchronization

The mechanism of websocket and zookeeper is similar,when the gateway and the shenyu-admin establish a websocket connection,shenyu-admin will push all data at once,it will automatically push incremental data to shenyu-web through websocket when configured data changes

When we use websocket synchronization,pay attention to reconnect after disconnection,which also called keep heartbeat.Apache ShenYu uses java-websocket ,a third-party library,to connect to websocket. If you want to learn more about the code implementation, refer to the source code `WebSocketSyncDataService`.

Http Long Polling

The mechanism of zookeeper and websocket data synchronization is relatively simple,but http synchronization will be relatively complicated.ShenYu borrows the design ideas of Apollo and Nacos and realizes http long polling data synchronization using their advantages.Note that this is not traditional ajax long polling.

http long polling mechanism as above,shenyu-web gateway requests shenyu-admin configuration services,timeout is 90 seconds,it means gateway layer request configuration service will wait at most 90 seconds,this is convenient for shenyu-admin configuration service to respond modified data in time,and therefore we realize near real-time push.

After the http request reaches shenyu-admin, it does not respond immediately,but uses the asynchronous mechanism of Servlet3.0 to asynchronously respond to the data.First of all,put long polling request task `LongPollingClient` into `BlockingQueue`,and then start scheduling task,execute after 60 seconds,this aims to remove the long polling request from the queue after 60 seconds,even there is no configured data change.Because even if there is no configuration change,gateway also need to know,otherwise it will wait,and there is a 90 seconds timeout when the gateway requests configuration services.

If the administrator changes the configuration data during this period,the long polling requests in the queue will be removed one by one, and respond which group's data has changed(we distribute plugins, rules, flow configuration , user configuration data into different groups).After gateway receives response,it only knows which Group has changed its configuration,it need to request again to get group configuration data.Someone may ask,why don't you write out the changed data directly?We also discussed this issue deeply during development, because the http long polling mechanism can only guarantee quasi real-time,if gateway layer does not handle it in time,or administrator updates configuration frequently,we probably missed some configuration change push.For security, we only inform that a certain Group information has changed.

When shenyu-web gateway layer receives the http response information,pull modified information(if exists),and then request shenyu-admin configuration service again,this will repeatedly execute. If you want to learn more about the code implementation, refer to the source code `HttpSyncDataService`.

Nacos Synchronization

The synchronization principle of Nacos is basically similar to that of ZooKeeper, and it mainly depends on the configuration management of Nacos. The path of each configuration node is similar to that of ZooKeeper.

ShenYu gateway will monitor the configured node. At startup, if there is no configuration node in Nacos, it will write the synchronous full amount of data into Nacos. When the sequential data send changes, it will update the configuration node in Nacos in full amount. The local cache is updated.

If you want to learn more about the code implementation, please refer to the source code `NacosSyncDataService` and the official documentation for [Nacos](#).

Etcd Synchronization

Etcd data synchronization principle is similar to Zookeeper, mainly relying on Etcd's watch mechanism, and each configuration node path is the same as that of Zookeeper.

The native API for Etcd is a bit more complicated to use, so it's somewhat encapsulated.

ShenYu gateway will listen to the configured node. When startup, if there is no configuration node in Etcd, it will write the synchronous full amount of data into Etcd. When the sequential data send changes, it will update the configuration node in Etcd incrementally.

If you want to learn more about the code implementation, refer to the source `EtcdSyncDataService`.

Consul Synchronization

Consul data synchronization principle is that the gateway regularly polls Consul's configuration center to get the configuration version number for local comparison.

ShenYu gateway will poll the configured nodes regularly, and the default interval is 1s. When startup, if there is no configuration node in Consul, write the synchronous full amount of data into Consul, then incrementally update the configuration node in Consul when the subsequent data is sent to change. At the same time, Apache ShenYu Gateway will regularly polls the node of configuration information and pull the configuration version number for comparison with the local one. The local cache is updated when the version number is changed.

If you want to learn more about the code implementation, refer to the source `ConsulSyncDataService`.

7.3 Application Client Access

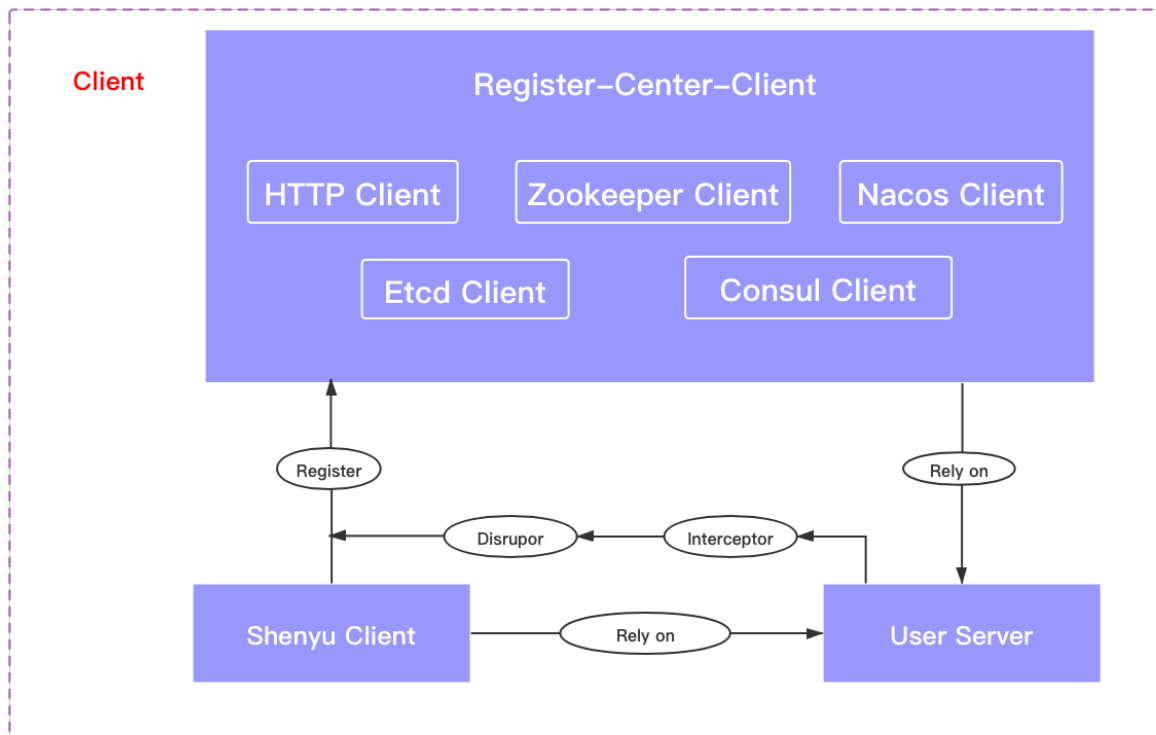
Application client access means to access your microservice to ShenYu gateway, currently supports HTTP, Dubbo, Spring Cloud, gRPC, Motan, Sofa, Tars and other protocols access.

Connecting the application client to ShenYu gateway is realized through the registration center, which involves the registration of the client and the synchronization of the server data. The registry supports HTTP, ZooKeeper, Etcd, Consul, and Nacos.

Refer to the client access configuration in the user documentation for [Application Client Access Config](#).

7.3.1 Design principle

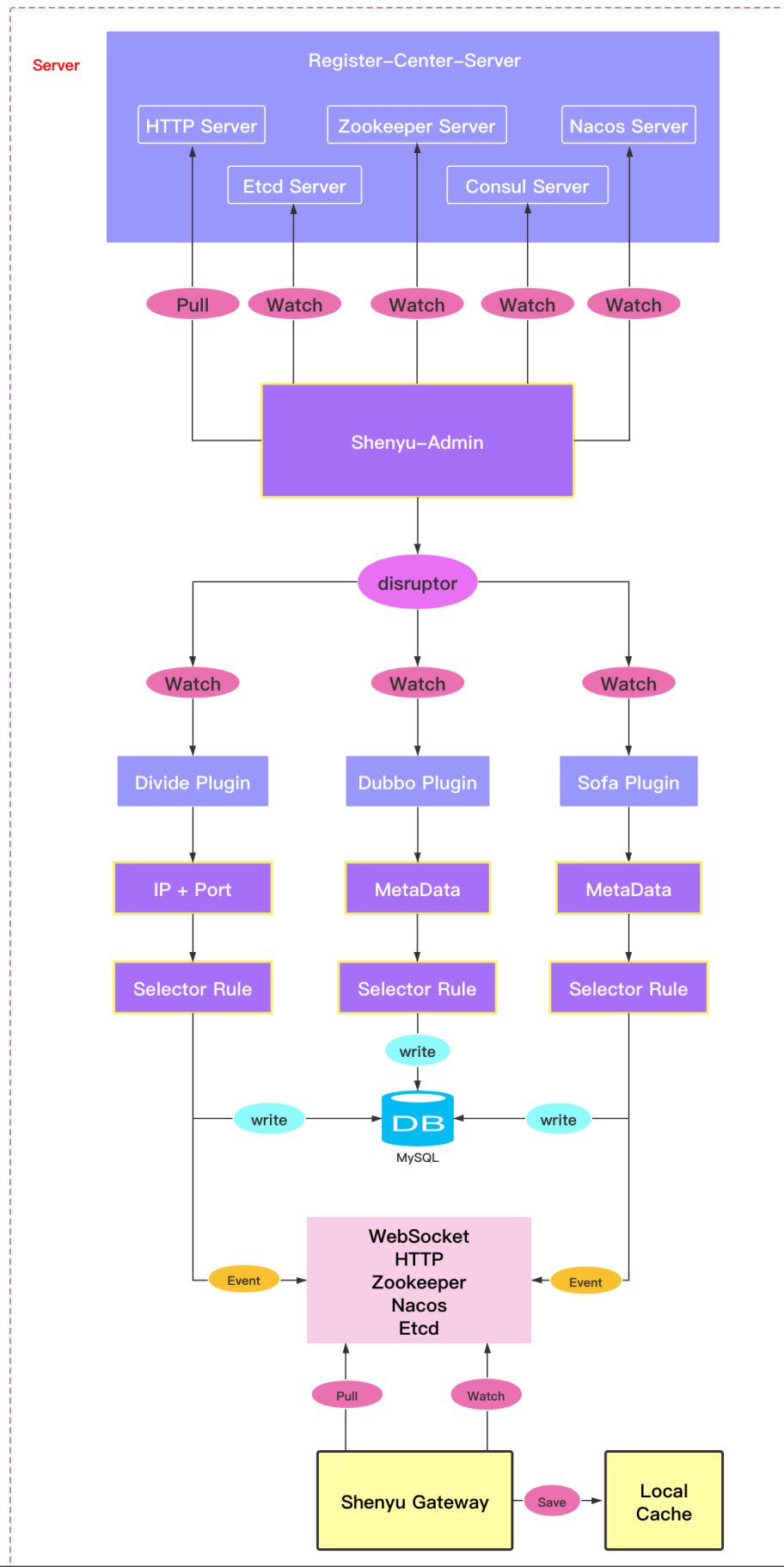
Client



Declare the registry client type, such as HTTP or ZooKeeper, in your microservice configuration. Use SPI to load and initialize the corresponding registry client when the application starts, implement the post-processor interface associated with the Spring Bean, get the service interface information to register in it, and place the obtained information into Disruptor.

The Registry client reads data from the Disruptor and registers the interface information with shenyu-admin, where the Disruptor decouples data from operations for scaling.

Server



Declare the registry server type, such as HTTP or ZooKeeper, in the Shenyu-Admin configuration. When shenyu-admin is started, it will read the configuration type, load and initialize the corresponding registry server, and when the registry server receives the interface information registered by shenyu-client, it will put it into Disruptor, which will trigger the registration processing logic to update the interface information and publish a synchronous event.

Disruptor provides data and operations decoupling for expansion. If there are too many registration requests, resulting in abnormal registration, there is also a data buffer role.

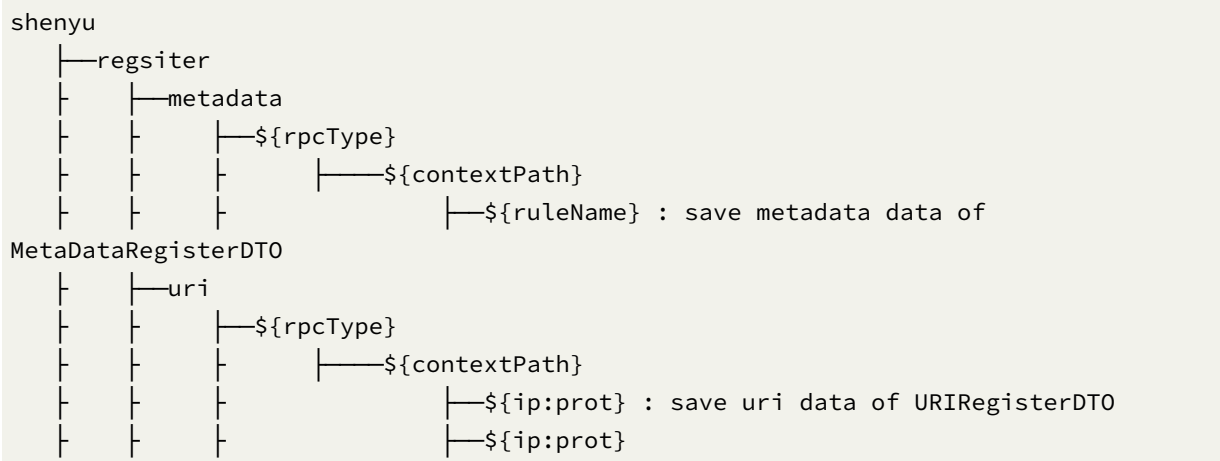
7.3.2 Http Registry

The principle of HTTP service registration is relatively simple. After Shenyu-Client is started, the relevant service registration interface of Shenyu-Admin will be called to upload data for registration.

After receiving the request, shenyu-admin will update the data and publish the data synchronization event to synchronize the interface information to ShenYu Gateway.

7.3.3 Zookeeper Registry

Zookeeper storage struct is:

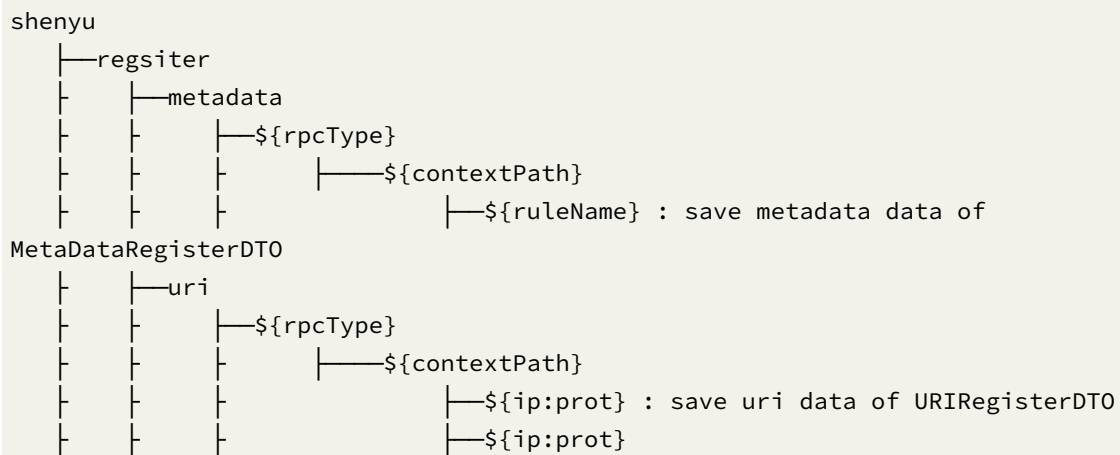


shenyu-client starts up, the service interface information (MetadataRegisterDTO/URIRegisterDTO) wrote above the Zookeeper nodes.

shenyu-admin uses the Watch mechanism of Zookeeper to monitor events such as data update and deletion, and triggers the corresponding registration processing logic after data changes. Upon receipt of a change to the MetadataregisterDTO node, the data change and data synchronization event publication of the selector and rule is triggered. Upon receipt of a UriRegisterDTO node change, the upstream of the selector is triggered to publish an update and data synchronization event.

7.3.4 Etcd Registry

Etcd storage struct is:

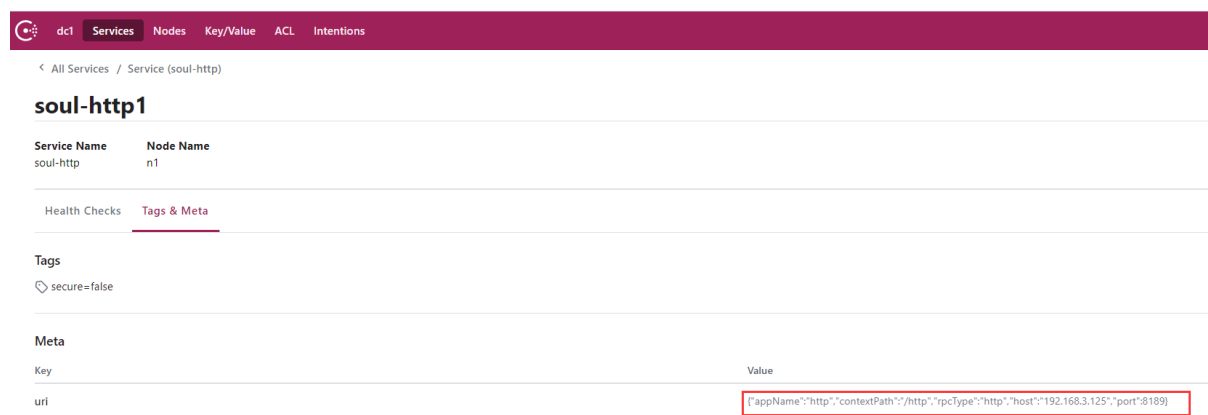


shenyu-client starts up, the service interface information (MetaDataRegisterDTO/URIRegisterDTO) wrote in Ephemeral way above Etcd of the node.

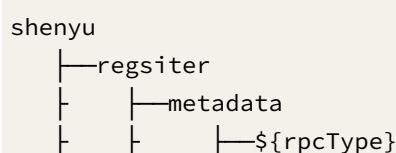
shenyu-admin uses Etcd's Watch mechanism to monitor events such as data update and deletion, and triggers the corresponding registration processing logic after data changes. Upon receipt of a change to the MetadataregisterDTO node, the data change and data synchronization event publication of the selector and rule is triggered. Upon receipt of a UriRegisterDTO node change, the upstream of the selector is triggered to publish an update and data synchronization event.

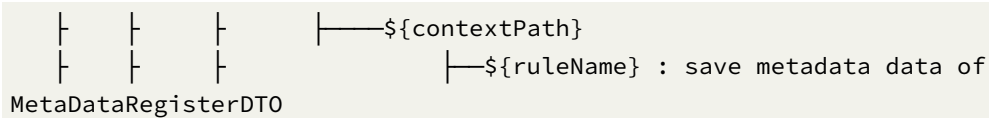
7.3.5 Consul Registry

Consul register client will save URIRegisterDTO to service instance metadata, and URIRegisterDTO will disappear with service unregister.



And Consul register client will save MetaDataRegisterDTO to Key/Value store, storage struct is:





When shenyu-client is started, The service interface information (MetaDataRegisterDTO/URIRegisterDTO) on the Metadata of the ServiceInstance (URIRegisterDTO) and Key-Value (MetaDataRegisterDTO), Store as described above.

shenyu-admin senses the update and deletion of data by monitoring the change of index of Catalog and KeyValue, and triggers the corresponding registration processing logic after the change of data. Upon receipt of a change to the MetadataregisterDTO node, the data change and data synchronization event publication of the selector and rule is triggered. Upon receipt of a UriRegisterDTO node change, the upstream of the selector is triggered to publish an update and data synchronization event.

7.3.6 Nacos Register

Nacos registration is divided into two parts: URI and Metadata. URI is registered by instance. In case of service exception, the relevant URI data node will be deleted automatically and send events to the subscriber, and the subscriber will carry out relevant offline processing. Metadata is registered by configuration without any related up-down operation. When a URI instance is registered, the Metadata configuration will be published accordingly. The subscriber monitors data changes and carries out update processing.

The URI instance registration command rules are as follows:

```
shenyu.register.service.${rpcType}
```

Listens on all RpcType nodes initially, and the `{contextPath}` instances registered under them are distinguished by IP and Port, and carry their corresponding contextPath information. After the URI instance is offline, it triggers the update and data synchronization event publication of the selector's upstream.

When the URI instance goes online, the corresponding Metadata data will be published. The node name command rules are as follows:

```
shenyu.register.service.${rpcType}.${contextPath}
```

The subscriber side continues to listen for all Metadata configurations, triggering selector and rule data changes and data synchronization events after the initial subscription and configuration update.

7.3.7 SPI

<i>SPI Name</i>	<i>Description</i>
ShenyuClientRegisterRepository	ShenYu client register SPI

<i>Implementation Class</i>	<i>Description</i>
HttpClientRegisterRepository	Http client register repository
ZookeeperClientRegisterRepository	Zookeeper client register repository
EtcdClientRegisterRepository	Etcd client register repository
ConsulClientRegisterRepository	Consul client register repository
NacosClientRegisterRepository	Nacos client register repository

<i>SPI Name</i>	<i>Description</i>
ShenyuServerRegisterRepository	ShenYu server register SPI

<i>Implementation Class</i>	<i>Description</i>
ShenyuHttpRegistryController	Http server repository
ZookeeperServerRegisterRepository	Zookeeper server registry repository
EtcdServerRegisterRepository	Etcd server registry repository
ConsulServerRegisterRepository	Consul server registry repository
NacosServerRegisterRepository	Nacos server registry repository

7.4 Flow Control

ShenYu gateway realizes flow control through plugins, selectors and rules. For related data structure, please refer to the previous [Apache ShenYu Admin Database Design](#).

7.4.1 Plugin

In Apache ShenYu Admin System, each plugin uses Handle (JSON format) fields to represent different processing, and the plugin processing is used to manage and edit the custom processing fields in the JSON.

The main purpose of this feature is to enable plugins to handle templated configurations.

7.4.2 Selector And Rule

Selector and rule are the most soul of Apache ShenYu Gateway. Master it and you can manage any traffic.

A plugin has multiple selectors, and one selector corresponds to multiple rules. The selector is the first level filter of traffic, and the rule is the final filter. For a plugin, we want to meet the traffic criteria based on our configuration before the plugin will be executed. Selectors and rules are designed to allow traffic to perform what we want under certain conditions. The rules need to be understood first.

The execution logic of plugin, selector and rule is as follows. When the traffic enters into ShenYu gateway, it will first judge whether there is a corresponding plugin and whether the plugin is turned on. Then determine whether the traffic matches the selector of the plugin. It then determines whether the traffic matches the rules of the selector. If the request traffic meets the matching criteria, the plugin will be executed. Otherwise, the plugin will not be executed. Process the next one. ShenYu gateway is so through layers of screening to complete the flow control.

7.5 SPI Design

SPI, called Service Provider Interface, is a built-in JDK Service that provides discovery function and a dynamic replacement discovery mechanism.

`shenyu-spi` is a custom SPI extension implementation for Apache Shenyu gateway. The design and implementation principles refer to [SPI Extension Implementations](#).

7.5.1 Registry Center

Consul, Etcd, Http, Nacos and Zookeeper are supported. The expansion of the registry including client and server, interface respectively `ShenyuServerRegisterRepository` and `ShenyuClientRegisterRepository`.

7.5.2 Metrics Center

Responsible for service monitoring, loading concrete implementation through SPI, currently support Prometheus, service interface is `MetricsBootService`.

7.5.3 Load Balance

Select one of the service providers to call. Currently, the supported algorithms are Has, Random, and RoundRobin, and the extended interface is `LoadBalance`.

7.5.4 RateLimiter

In the RateLimiter plugin, which stream limiting algorithm to use, currently supporting Concurrency, LeakyBucke, SlidingWindow and TokenBucket, the extension interface is RateLimiterAlgorithm.

7.5.5 Match Strategy

Which matching method to use when adding selectors And rules, currently supports And, Or, And the extension interface is MatchStrategy.

7.5.6 Parameter Data

Currently, URI,RequestMethod, Query, Post, IP, Host, Cookie, and Header are supported. The extended interface is ParameterData.

7.5.7 Predicate Judge

Which conditional policy to use when adding selectors and rules currently supports Match, Contains,Equals, Groovy, Regex, SpEL, TimerAfter and TimerBefore. The extension interface is PredicateJudge.

8.1 Local Deployment

This article introduces how to start the Apache ShenYu gateway in the local environment.

8.1.1 Environmental preparation

- Install JDK1.8+ locally
- Install Git locally
- Install Maven locally
- Choose a development tool, such as IDEA

8.1.2 Download the compiled code

- Download

```
> git clone https://github.com/apache/incubator-shenyu.git
> cd shenyu
> mvn clean install -Dmaven.javadoc.skip=true -B -Drat.skip=true -Djacoco.skip=true
-DskipITs -DskipTests
```

- use the development tool to start `org.apache.shenyu.admin.ShenyuAdminBootstrap`, Visit <http://localhost:9095>, the default username and password are: admin and 123456 respectively.
 - If you use h2 to store, set the variable `--spring.profiles.active = h2`.
 - If you use MySQL for storage, modify the mysql configuration in `application.yaml`.
- use the development tool to start `org.apache.shenyu.bootstrap.ShenyuBootstrapApplication`.

8.2 Binary Packages Deployment

This article introduces the deployment of the Apache ShenYu gateway using the binary packages.

8.2.1 Start Apache ShenYu Admin

- download `apache-shenyu-incubating-2.4.0-admin-bin.tar.gz`
- unzip `apache-shenyu-incubating-2.4.0-admin-bin.tar.gz`. go to the `bin` directory.
- use `h2` to store data:

```
> windows: start.bat --spring.profiles.active = h2
> linux: ./start.sh --spring.profiles.active = h2
```

- use MySQL to store data, go to the `/conf` directory, and modify the configuration of `mysql` in `application.yaml`.

```
> windows: start.bat
> linux: ./start.sh
```

8.2.2 Start Apache ShenYu Bootstrap

- download `apache-shenyu-incubating-2.4.0-bootstrap-bin.tar.gz`
- unzip `apache-shenyu-incubating-2.4.0-bootstrap-bin.tar.gz`. go to the `bin` directory.

```
> windows : start.bat
> linux : ./start.sh
```

8.3 Docker Deployment

This article introduces the use of docker to deploy the Apache ShenYu gateway.

8.3.1 Start Apache ShenYu Admin

```
> docker pull apache/shenyu-admin
> docker network create shenyu
```

- use h2 to store data:

```
> docker run -d -p 9095:9095 --net shenyu apache/shenyu-admin
```

- use MySQL to store data, copy mysql-connector.jar to /\$(your_work_dir)/ext-lib:

```
docker run -v /${your_work_dir}/ext-lib:/opt/shenyu-admin/ext-lib -e "SPRING_
PROFILES_ACTIVE=mysql" -e "spring.datasource.url=jdbc:mysql://${your_ip_port}/
shenyu?useUnicode=true&characterEncoding=utf-8&useSSL=false" -e "spring.datasource.
user=${your_username}" -e "spring.datasource.password=${your_password}" -d -p
9095:9095 --net shenyu apache/shenyu-admin
```

another way is to put the application.yml configuration in \${your_work_dir}/conf, and then execute the following statement:

```
docker run -v ${your_work_dir}/conf:/opt/shenyu-admin/conf/ -v /${your_work_dir}/
ext-lib:/opt/shenyu-admin/ext-lib -d -p 9095:9095 --net shenyu apache/shenyu-admin
```

8.3.2 Start Apache ShenYu Bootstrap

```
> docker network create shenyu
> docker pull apache/shenyu-bootstrap
> docker run -d -p 9195:9195 --net shenyu apache/shenyu-bootstrap
```

8.4 k8s Deployment

This article introduces the use of k8s to deploy the Apache ShenYu gateway.

8.5 Helm Deployment

This article introduces the use of helm to deploy the Apache ShenYu gateway.

8.6 Custom Deployment

This article describes how to build your own gateway based on Apache ShenYu.

8.6.1 Start Apache ShenYu Admin

- docker reference docker deployment Apache ShenYu Admin
- linux/windows reference binary packages deployment Apache ShenYu Admin

8.6.2 Build your own gateway (recommended)

- first create an empty springboot project, you can refer to shenyu-bootstrap, or you can create it on [spring official website](#).
- introduce the following jar package:

```
<dependencies>
  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-webflux</artifactId>
    <version>2.2.2.RELEASE</version>
  </dependency>
  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-actuator</artifactId>
    <version>2.2.2.RELEASE</version>
  </dependency>
  <dependency>
    <groupId>org.apache.shenyu</groupId>
    <artifactId>shenyu-spring-boot-starter-gateway</artifactId>
    <version>${project.version}</version>
  </dependency>
  <dependency>
    <groupId>org.apache.shenyu</groupId>
    <artifactId>shenyu-spring-boot-starter-sync-data-websocket</artifactId>
    <version>${project.version}</version>
  </dependency>
</dependencies>
```

among them, `${project.version}` please use the current latest version.

- add the following configuration to your `application.yaml` file:

```
spring:
  main:
    allow-bean-definition-overriding: true
management:
```

```
health:
  defaults:
    enabled: false
shenyu:
  sync:
    websocket:
      urls: ws://localhost:9095/websocket //set to your shenyu-admin address
```

9.1 Quick start with Http

This document introduces how to quickly access the Apache ShenYu gateway using Http. You can get the code example of this document by clicking [here](#).

9.1.1 Environment to prepare

Please refer to the deployment to select a way to start shenyu-admin. For example, start the Apache ShenYu gateway management system through [local deployment](#).

After successful startup, you need to open the Divide plugin on in the BasicConfig -> Plugin. In the Apache ShenYu gateway, the HTTP request is handled by the Divide plugin.

If you are a startup gateway by means of source, can be directly run the ShenYuBootstrapApplication of shenyu-bootstrap module.

Note: Before starting, make sure the gateway has added dependencies.

Add the following dependencies to the gateway's pom.xml file:

```
<!--if you use http proxy start this-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-divide</artifactId>
  <version>${project.version}</version>
</dependency>

<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-httpclient</artifactId>
  <version>${project.version}</version>
</dependency>
```

9.1.2 Run the shenyu-examples-http project

Download [shenyu-examples-http](#)

Execute the `org.apache.shenyu.examples.http.ShenyuTestHttpApplication` main method to start project.

The following log appears when the startup is successful:

```
2021-02-10 00:57:07.561 INFO 3700 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : http client register success: {"appName":"http","context":"/http",
"path":"/http/test/**","pathDesc":"","rpcType":"http","host":"192.168.50.13","port
":8188,"ruleName":"/http/test/**","enabled":true,"registerMetaData":false}
2021-02-10 00:57:07.577 INFO 3700 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : http client register success: {"appName":"http","context":"/http",
"path":"/http/order/save","pathDesc":"Save order","rpcType":"http","host":"192.168.
50.13","port":8188,"ruleName":"/http/order/save","enabled":true,"registerMetaData
":false}
2021-02-10 00:57:07.587 INFO 3700 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : http client register success: {"appName":"http","context":"/http",
"path":"/http/order/path/**/name","pathDesc":"","rpcType":"http","host":"192.168.
50.13","port":8188,"ruleName":"/http/order/path/**/name","enabled":true,
"registerMetaData":false}
2021-02-10 00:57:07.596 INFO 3700 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : http client register success: {"appName":"http","context":"/http",
"path":"/http/order/findById","pathDesc":"Find by id","rpcType":"http","host":"192.
168.50.13","port":8188,"ruleName":"/http/order/findById","enabled":true,
"registerMetaData":false}
2021-02-10 00:57:07.606 INFO 3700 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : http client register success: {"appName":"http","context":"/http",
"path":"/http/order/path/**","pathDesc":"","rpcType":"http","host":"192.168.50.13",
"port":8188,"ruleName":"/http/order/path/**","enabled":true,"registerMetaData
":false}
2021-02-10 00:57:08.023 INFO 3700 --- [          main] o.s.b.web.embedded.netty.
NettyWebServer : Netty started on port(s): 8188
2021-02-10 00:57:08.026 INFO 3700 --- [          main] o.d.s.e.http.
ShenyuTestHttpApplication : Started ShenyuTestHttpApplication in 2.555 seconds
(JVM running for 3.411)
```

9.1.3 Test

The `shenyu-examples-http` project will automatically register interface methods annotated with `@ShenyuSpringMvcClient` in the Apache ShenYu gateway after successful startup.

Open `PluginList` -> `rpc proxy` -> `divide` to see the list of plugin rule configurations:

SelectorList

Add

Name	Open	Operation
/http	Open	Modify Delete

< 1 >

RulesList

Synchronous divide

Add

	RuleName	Open	UpdateTime	Operation
+	/http/test/**	Open	2021-02-10 00:57:07	Modify Delete
+	/http/order/save	Open	2021-02-10 00:57:07	Modify Delete
+	/http/order/path/**/name	Open	2021-02-10 00:57:07	Modify Delete
+	/http/order/findById	Open	2021-02-10 00:57:07	Modify Delete
+	/http/order/path/**	Open	2021-02-10 00:57:07	Modify Delete

< 1 >

Use PostMan to simulate HTTP to request your http service:

POST http://localhost:9195/http/order/save

Authorization Headers (1) Body Pre-request Script Tests

form-data x-www-form-urlencoded raw binary JSON (application/json)

```

1 {
2   "id": "123",
3   "name": "test"
4 }
5

```

Body Cookies Headers (2) Test Results Status: 200 OK Time: 410 ms

Pretty Raw Preview JSON

```

1 {
2   "id": "123",
3   "name": "hello world save order"
4 }

```

9.2 Quick start with Dubbo

This document introduces how to quickly access the Apache ShenYu gateway using Dubbo. You can get the code example of this document by clicking [here](#).

9.2.1 Environment to prepare

Please refer to the deployment to select a way to start shenyu-admin. For example, start the Apache ShenYu gateway management system through [local deployment](#).

After successful startup, you need to open the Dubbo plugin on in the BasicConfig -> Plugin, and set your registry address. Please make sure the registry center is open locally.

If you are a startup gateway by means of source, can be directly run the ShenYuBootstrapApplication of shenyu-bootstrap module.

Note: Before starting, make sure the gateway has added dependencies.

If client is apache dubbo, registry center is Zookeeper, please refer to the following configuration:

```

<!-- apache shenyu apache dubbo plugin start-->
<dependency>
  <groupId>org.apache.shenyu</groupId>

```

```

        <artifactId>shenyu-spring-boot-starter-plugin-apache-dubbo</artifactId>
        <version>${project.version}</version>
    </dependency>
    <dependency>
        <groupId>org.apache.dubbo</groupId>
        <artifactId>dubbo</artifactId>
        <version>2.7.5</version>
    </dependency>
    <!-- Dubbo zookeeper registry dependency start -->
    <dependency>
        <groupId>org.apache.curator</groupId>
        <artifactId>curator-client</artifactId>
        <version>4.0.1</version>
        <exclusions>
            <exclusion>
                <artifactId>log4j</artifactId>
                <groupId>log4j</groupId>
            </exclusion>
        </exclusions>
    </dependency>
    <dependency>
        <groupId>org.apache.curator</groupId>
        <artifactId>curator-framework</artifactId>
        <version>4.0.1</version>
    </dependency>
    <dependency>
        <groupId>org.apache.curator</groupId>
        <artifactId>curator-recipes</artifactId>
        <version>4.0.1</version>
    </dependency>
    <!-- Dubbo zookeeper registry dependency end -->
    <!-- apache shenyu  apache dubbo plugin end-->

```

If client is alibaba dubbo, registry center is Zookeeper, please refer to the following configuration:

```

    <!-- apache shenyu alibaba dubbo plugin start-->
    <dependency>
        <groupId>org.apache.shenyu</groupId>
        <artifactId>shenyu-spring-boot-starter-plugin-alibaba-dubbo</artifactId>
        <version>${project.version}</version>
    </dependency>
    <dependency>
        <groupId>com.alibaba</groupId>
        <artifactId>dubbo</artifactId>
        <version>${alibaba.dubbo.version}</version>
    </dependency>
    <dependency>
        <groupId>org.apache.curator</groupId>

```

```

<artifactId>curator-client</artifactId>
<version>${curator.version}</version>
<exclusions>
  <exclusion>
    <artifactId>log4j</artifactId>
    <groupId>log4j</groupId>
  </exclusion>
</exclusions>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-framework</artifactId>
  <version>${curator.version}</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-recipes</artifactId>
  <version>${curator.version}</version>
</dependency>
<!-- apache shenyu alibaba dubbo plugin end-->

```

9.2.2 Run the shenyu-examples-dubbo project

Download [shenyu-examples-dubbo](#) .

replace the register address in shenyu-examples-alibaba-dubbo-service/src/main/resources/spring-dubbo.xml with your local zk address, such as:

```
<dubbo:registry address="zookeeper://localhost:2181"/>
```

Execute the `org.apache.shenyu.examples.alibaba.dubbo.service.TestAlibabaDubboApplication` main method to start dubbo project.

The following log appears when the startup is successful:

```

2021-02-06 20:58:01.807 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/insert","pathDesc":"Insert a row of data","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboTestService",
"methodName":"insert","ruleName":"/dubbo/insert","parameterTypes":"org.dromara.
shenyu.examples.dubbo.api.entity.DubboTest","rpcExt":{"group":"","version":"","
","loadbalance":"random","retries":2,"timeout":10000,"url":"","enabled":true}
2021-02-06 20:58:01.821 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/findAll","pathDesc":"Get all data","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboTestService",
"methodName":"findAll","ruleName":"/dubbo/findAll","parameterTypes":"","rpcExt":{"
group":"","version":"","","loadbalance":"random","retries":2,"timeout":
10000,"url":"","enabled":true}

```



```
2021-02-06 20:58:01.833 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/findById","pathDesc":"Query by Id","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboTestService",
"methodName":"findById","ruleName":"/dubbo/findById","parameterTypes":"java.lang.
String","rpcExt":{"group":"","version":"","loadbalance":"random","retries\
":2,"timeout":10000,"url":"","enabled":true}}
```

```
2021-02-06 20:58:01.844 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/findById","pathDesc":"","rpcType":"dubbo","serviceName":
"org.dromara.shenyu.examples.dubbo.api.service.DubboMultiParamService","methodName
":"findById","ruleName":"/dubbo/findById","parameterTypes":"java.util.List
","rpcExt":{"group":"","version":"","loadbalance":"random","retries\
":2,"timeout":10000,"url":"","enabled":true}}
```

```
2021-02-06 20:58:01.855 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/findByIdsAndName","pathDesc":"","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboMultiParamService
","methodName":"findByIdsAndName","ruleName":"/dubbo/findByIdsAndName",
"parameterTypes":"java.util.List,java.lang.String","rpcExt":{"group":"","
version":"","loadbalance":"random","retries":2,"timeout":10000,"url\
":"","enabled":true}}
```

```
2021-02-06 20:58:01.866 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/batchSave","pathDesc":"","rpcType":"dubbo","serviceName":
"org.dromara.shenyu.examples.dubbo.api.service.DubboMultiParamService","methodName
":"batchSave","ruleName":"/dubbo/batchSave","parameterTypes":"java.util.List",
"rpcExt":{"group":"","version":"","loadbalance":"random","retries\
":2,"timeout":10000,"url":"","enabled":true}}
```

```
2021-02-06 20:58:01.876 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/findByIdsAndName","pathDesc":"","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboMultiParamService
","methodName":"findByIdsAndName","ruleName":"/dubbo/findByIdsAndName",
"parameterTypes":"[Ljava.lang.Integer;java.lang.String","rpcExt":{"group":"","
version":"","loadbalance":"random","retries":2,"timeout":10000,"url\
":"","enabled":true}}
```

```
2021-02-06 20:58:01.889 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/saveComplexBeanTestAndName","pathDesc":"","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboMultiParamService
","methodName":"saveComplexBeanTestAndName","ruleName":"/dubbo/
saveComplexBeanTestAndName","parameterTypes":"org.dromara.shenyu.examples.dubbo.
api.entity.ComplexBeanTest,java.lang.String","rpcExt":{"group":"","version\
":"","loadbalance":"random","retries":2,"timeout":10000,"url\
":"","enabled":true}}
```

```
2021-02-06 20:58:01.901 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/batchSaveAndNameAndId","pathDesc":"","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboMultiParamService
","methodName":"batchSaveAndNameAndId","ruleName":"/dubbo/batchSaveAndNameAndId",
```

9.2. Quick start with Dubbo 35

```
"parameterTypes":"java.util.List,java.lang.String,java.lang.String","rpcExt":{"
group":"","version":"","loadbalance":"random","retries":2,"timeout\
":10000,"url":"","enabled":true}}
```

```

2021-02-06 20:58:01.911 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/saveComplexBeanTest","pathDesc":"","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboMultiParamService",
"methodName":"saveComplexBeanTest","ruleName":"/dubbo/saveComplexBeanTest",
"parameterTypes":"org.dromara.shenyu.examples.dubbo.api.entity.ComplexBeanTest",
"rpcExt":{"group":"","version":"","loadbalance":"random","retries\
":2,"timeout":10000,"url":"","enabled":true}
2021-02-06 20:58:01.922 INFO 3724 --- [pool-2-thread-1] o.d.s.client.common.utils.
RegisterUtils : dubbo client register success: {"appName":"dubbo","contextPath":"/
dubbo","path":"/dubbo/findByStringArray","pathDesc":"","rpcType":"dubbo",
"serviceName":"org.dromara.shenyu.examples.dubbo.api.service.DubboMultiParamService",
"methodName":"findByStringArray","ruleName":"/dubbo/findByStringArray",
"parameterTypes":["Ljava.lang.String;","rpcExt":{"group":"","version":"","loadbalance\
":"random","retries":2,"timeout":10000,"url":"","enabled
":true}

```

9.2.3 Test

The shenyu-examples-dubbo project will automatically register interface methods annotated with @ShenYuDubboClient in the Apache ShenYu gateway after successful startup.

Open PluginList -> rpc proxy -> dubbo to see the list of plugin rule configurations:

SelectorList

Add

Name	Open	Operation
/dubbo	Open	Modify Delete

<

1

>

RulesList

Synchronous dubbo

Add

	RuleName	Open	UpdateTime	Operation
+	/dubbo/insert	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/findAll	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/findById	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/findByIdListId	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/findByIdsAndName	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/batchSave	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/findByIdsAndName	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/saveComplexBeanTestAndName	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/batchSaveAndNameAndId	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/saveComplexBeanTest	Open	2021-02-06 20:58:01	Modify Delete
+	/dubbo/findByIdStringArray	Open	2021-02-06 20:58:01	Modify Delete

<

1

>

Use PostMan to simulate HTTP to request your Dubbo service:



Complex multi-parameter example: The related interface implementation class is `org.apache.shenyu.examples.alibaba.dubbo.service.impl.DubboMultiParamServiceImpl#batchSaveAndNameAndId`.

```
@Override
@ShenyuDubboClient(path = "/batchSaveAndNameAndId")
public DubboTest batchSaveAndNameAndId(List<DubboTest> dubboTestList, String id,
String name) {
    DubboTest test = new DubboTest();
    test.setId(id);
    test.setName("hello world shenyu alibaba dubbo param batchSaveAndNameAndId :" +
name + ":" + dubboTestList.stream().map(DubboTest::getName).collect(Collectors.
joining("-")));
    return test;
}
```

The screenshot shows a REST client interface. The top bar indicates a POST request to `http://localhost:9195/dubbo/batchSaveAndNameAndId`. The 'Body' tab is selected, showing a JSON request body:

```
{
  "dubboTestList": [{"id": "1", "name": "test"}],
  "id": "2",
  "name": "multi-params"
}
```

Below the request, the 'Body' tab shows the response in JSON format:

```
{
  "code": 200,
  "message": "Access to success!",
  "data": {
    "name": "hello world soul apache dubbo param batchSaveAndNameAndId :multi-params:test",
    "id": "2"
  }
}
```

The status bar at the bottom right indicates 'Status: 200 OK' and 'Time: 38 ms'.

When your arguments do not match, the following exception will occur:

```
2021-02-07 22:24:04.015 ERROR 14860 --- [:20888-thread-3] o.d.shenyu.web.handler.
GlobalExceptionHandler : [e47b2a2a] Resolved [ShenyuException: org.apache.dubbo.
remoting.RemotingException: java.lang.IllegalArgumentException: args.length !=
types.length
java.lang.IllegalArgumentException: args.length != types.length
    at org.apache.dubbo.common.utils.PojoUtils.realize(PojoUtils.java:91)
    at org.apache.dubbo.rpc.filter.GenericFilter.invoke(GenericFilter.java:82)
    at org.apache.dubbo.rpc.protocol.ProtocolFilterWrapper$1.
invoke(ProtocolFilterWrapper.java:81)
    at org.apache.dubbo.rpc.filter.ClassLoaderFilter.invoke(ClassLoaderFilter.
java:38)
    at org.apache.dubbo.rpc.protocol.ProtocolFilterWrapper$1.
invoke(ProtocolFilterWrapper.java:81)
    at org.apache.dubbo.rpc.filter.EchoFilter.invoke(EchoFilter.java:41)
    at org.apache.dubbo.rpc.protocol.ProtocolFilterWrapper$1.
invoke(ProtocolFilterWrapper.java:81)
```

```

    at org.apache.dubbo.rpc.protocol.dubbo.DubboProtocol$1.reply(DubboProtocol.
java:150)
    at org.apache.dubbo.remoting.exchange.support.header.HeaderExchangeHandler.
handleRequest(HeaderExchangeHandler.java:100)
    at org.apache.dubbo.remoting.exchange.support.header.HeaderExchangeHandler.
received(HeaderExchangeHandler.java:175)
    at org.apache.dubbo.remoting.transport.DecodeHandler.received(DecodeHandler.
java:51)
    at org.apache.dubbo.remoting.transport.dispatcher.ChannelEventRunnable.
run(ChannelEventRunnable.java:57)
    at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.
java:1149)
    at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.
java:624)
    at java.lang.Thread.run(Thread.java:748)
] for HTTP POST /dubbo/batchSaveAndNameAndId

```

9.3 Quick start with Spring Cloud

This document introduces how to quickly access the Apache ShenYu gateway using Spring Cloud. You can get the code example of this document by clicking [here](#).

9.3.1 Environment to prepare

Please refer to the deployment to select a way to start shenyu-admin. For example, start the Apache ShenYu gateway management system through [local deployment](#).

After successful startup, you need to open the springCloud plugin on in the BasicConfig -> Plugin.

If you are a startup gateway by means of source, can be directly run the ShenYuBootstrapApplication of shenyu-bootstrap module.

Note: Before starting, make sure the gateway has added dependencies.

Add the gateway proxy plugin for Spring Cloud and add the your registry center dependencies:

```

<!-- apache shenyu springCloud plugin start-->
    <dependency>
        <groupId>org.apache.shenyu</groupId>
        <artifactId>shenyu-spring-boot-starter-plugin-springcloud</
artifactId>

        <version>${project.version}</version>
    </dependency>

    <dependency>
        <groupId>org.springframework.cloud</groupId>
        <artifactId>spring-cloud-commons</artifactId>

```

```

        <version>2.2.0.RELEASE</version>
    </dependency>
    <dependency>
        <groupId>org.springframework.cloud</groupId>
        <artifactId>spring-cloud-starter-netflix-ribbon</artifactId>
        <version>2.2.0.RELEASE</version>
    </dependency>

    <dependency>
        <groupId>org.apache.shenyu</groupId>
        <artifactId>shenyu-spring-boot-starter-plugin-httpclient</
artifactId>
        <version>${project.version}</version>
    </dependency>
    <!-- springCloud if you config register center is eureka please dependency
end-->
    <dependency>
        <groupId>org.springframework.cloud</groupId>
        <artifactId>spring-cloud-starter-netflix-eureka-client</
artifactId>
        <version>2.2.0.RELEASE</version>
    </dependency>
    <!-- apache shenyu springCloud plugin end-->

```

eureka config information:

```

eureka:
  client:
    serviceUrl:
      defaultZone: http://localhost:8761/eureka/
  instance:
    prefer-ip-address: true

```

Restart the shenyu-bootstrap project.

9.3.2 Run the shenyu-examples-springcloud project

In the example project we used Eureka as the registry for Spring Cloud. You can use the local Eureka or the application provided in the example.

Download [shenyu-examples-eureka](#) 、 [shenyu-examples-springcloud](#) .

Startup the Eureka service: Execute the `org.apache.shenyu.examples.eureka.EurekaServerApplication` main method to start project.

Startup the Spring Cloud service: Execute the `org.apache.shenyu.examples.springcloud.ShenyuTestSpringCloudApplication` main method to start project.

The following log appears when the startup is successful:

```

2021-02-10 14:03:51.301 INFO 2860 --- [          main] o.s.s.concurrent.
ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
2021-02-10 14:03:51.669 INFO 2860 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : springCloud client register success: {"appName":"springCloud-test
","context":"/springcloud","path":"/springcloud/order/save","pathDesc":"","rpcType
":"springCloud","ruleName":"/springcloud/order/save","enabled":true}
2021-02-10 14:03:51.676 INFO 2860 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : springCloud client register success: {"appName":"springCloud-test
","context":"/springcloud","path":"/springcloud/order/path/**","pathDesc":"","
","rpcType":"springCloud","ruleName":"/springcloud/order/path/**","enabled":true}
2021-02-10 14:03:51.682 INFO 2860 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : springCloud client register success: {"appName":"springCloud-test
","context":"/springcloud","path":"/springcloud/order/findById","pathDesc":"","
","rpcType":"springCloud","ruleName":"/springcloud/order/findById","enabled":true}
2021-02-10 14:03:51.688 INFO 2860 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : springCloud client register success: {"appName":"springCloud-test
","context":"/springcloud","path":"/springcloud/order/path/**/name","pathDesc":"","
","rpcType":"springCloud","ruleName":"/springcloud/order/path/**/name","enabled
":true}
2021-02-10 14:03:51.692 INFO 2860 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : springCloud client register success: {"appName":"springCloud-test
","context":"/springcloud","path":"/springcloud/test/**","pathDesc":"","rpcType":
"springCloud","ruleName":"/springcloud/test/**","enabled":true}
2021-02-10 14:03:52.806 WARN 2860 --- [          main]
ockingLoadBalancerClientRibbonWarnLogger : You already have
RibbonLoadBalancerClient on your classpath. It will be used by default. As Spring
Cloud Ribbon is in maintenance mode. We recommend switching to
BlockingLoadBalancerClient instead. In order to use it, set the value of `spring.
cloud.loadbalancer.ribbon.enabled` to `false` or remove spring-cloud-starter-
netflix-ribbon from your project.
2021-02-10 14:03:52.848 WARN 2860 --- [          main] igation
$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working
with default default cache. You can switch to using Caffeine cache, by adding it to
the classpath.
2021-02-10 14:03:52.921 INFO 2860 --- [          main] o.s.c.n.eureka.
InstanceInfoFactory : Setting initial instance status as: STARTING
2021-02-10 14:03:52.949 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient : Initializing Eureka in region us-east-1
2021-02-10 14:03:53.006 INFO 2860 --- [          main] c.n.d.provider.
DiscoveryJerseyProvider : Using JSON encoding codec LegacyJacksonJson
2021-02-10 14:03:53.006 INFO 2860 --- [          main] c.n.d.provider.
DiscoveryJerseyProvider : Using JSON decoding codec LegacyJacksonJson
2021-02-10 14:03:53.110 INFO 2860 --- [          main] c.n.d.provider.
DiscoveryJerseyProvider : Using XML encoding codec XStreamXml
2021-02-10 14:03:53.110 INFO 2860 --- [          main] c.n.d.provider.
DiscoveryJerseyProvider : Using XML decoding codec XStreamXml
2021-02-10 14:03:53.263 INFO 2860 --- [          main] c.n.d.s.r.aws.
ConfigClusterResolver : Resolving eureka endpoints via configuration

```

```

2021-02-10 14:03:53.546 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Disable delta property : false
2021-02-10 14:03:53.546 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Single vip registry refresh property : null
2021-02-10 14:03:53.547 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Force full registry fetch : false
2021-02-10 14:03:53.547 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Application is null : false
2021-02-10 14:03:53.547 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Registered Applications size is zero : true
2021-02-10 14:03:53.547 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Application version is -1: true
2021-02-10 14:03:53.547 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Getting all instance registry info from the eureka server
2021-02-10 14:03:53.754 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : The response status is 200
2021-02-10 14:03:53.756 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Starting heartbeat executor: renew interval is: 30
2021-02-10 14:03:53.758 INFO 2860 --- [          main] c.n.discovery.
InstanceInfoReplicator    : InstanceInfoReplicator onDemand update allowed rate
per min is 4
2021-02-10 14:03:53.761 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Discovery Client initialized at timestamp 1612937033760 with
initial instances count: 0
2021-02-10 14:03:53.762 INFO 2860 --- [          main] o.s.c.n.e.s.
EurekaServiceRegistry      : Registering application SPRINGCLOUD-TEST with eureka
with status UP
2021-02-10 14:03:53.763 INFO 2860 --- [          main] com.netflix.discovery.
DiscoveryClient    : Saw local status change event StatusChangeEvent
[timestamp=1612937033763, current=UP, previous=STARTING]
2021-02-10 14:03:53.765 INFO 2860 --- [nfoReplicator-0] com.netflix.discovery.
DiscoveryClient    : DiscoveryClient_SPRINGCLOUD-TEST/host.docker.
internal:springCloud-test:8884: registering service...
2021-02-10 14:03:53.805 INFO 2860 --- [          main] o.s.b.w.embedded.tomcat.
TomcatWebServer    : Tomcat started on port(s): 8884 (http) with context path ''
2021-02-10 14:03:53.807 INFO 2860 --- [          main] .s.c.n.e.s.
EurekaAutoServiceRegistration : Updating port to 8884
2021-02-10 14:03:53.837 INFO 2860 --- [nfoReplicator-0] com.netflix.discovery.
DiscoveryClient    : DiscoveryClient_SPRINGCLOUD-TEST/host.docker.
internal:springCloud-test:8884 - registration status: 204
2021-02-10 14:03:54.231 INFO 2860 --- [          main] o.d.s.e.s.
ShenyuTestSpringCloudApplication : Started ShenyuTestSpringCloudApplication in 6.
338 seconds (JVM running for 7.361)

```

9.3.3 Test

The shenyu-examples-springcloud project will automatically register interface methods annotated with @ShenyuSpringCloudClient in the Apache ShenYu gateway after successful startup.

Open PluginList -> rpc proxy -> springCloud to see the list of plugin rule configurations:

SelectorList

Add

Name	Open	Operation
/springcloud	Open	Modify Delete

< 1 >

RulesList

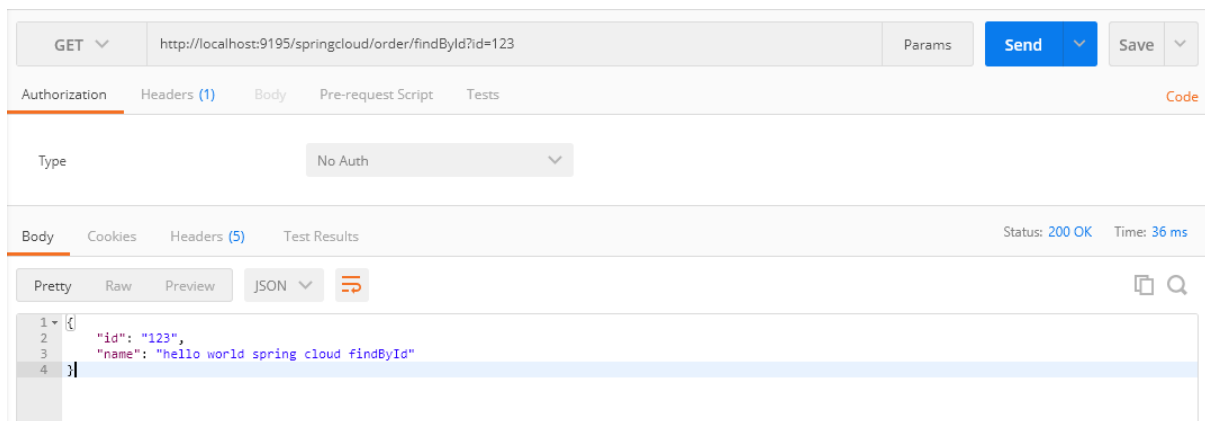
Synchronous springCloud

Add

	RuleName	Open	UpdateTime	Operation
+	/springcloud/order/save	Open	2021-02-10 14:00:04	Modify Delete
+	/springcloud/order/path/**/name	Open	2021-02-10 14:00:04	Modify Delete
+	/springcloud/order/findById	Open	2021-02-10 14:00:04	Modify Delete
+	/springcloud/order/path/**	Open	2021-02-10 14:00:04	Modify Delete
+	/springcloud/test/**	Open	2021-02-10 14:00:04	Modify Delete

< 1 >

Use PostMan to simulate HTTP to request your SpringCloud service:



9.4 Quick start with Sofa

This document introduces how to quickly access the Apache ShenYu gateway using Sofa RPC. You can get the code example of this document by clicking [here](#).

9.4.1 Environment to prepare

Please refer to the deployment to select a way to start shenyu-admin. For example, start the Apache ShenYu gateway management system through [local deployment](#).

After successful startup, you need to open the Sofa plugin on in the BasicConfig -> Plugin, and set your registry address. Please make sure the registry center is open locally.

If you are a startup gateway by means of source, can be directly run the ShenYuBootstrapApplication of shenyu-bootstrap module.

Note: Before starting, make sure the gateway has added dependencies.

If client is sofa, registry center is Zookeeper, please refer to the following configuration:


```

<!-- apache shenYu sofa plugin start-->
<dependency>
  <groupId>com.alipay.sofa</groupId>
  <artifactId>sofa-rpc-all</artifactId>
  <version>5.7.6</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-client</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-framework</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-recipes</artifactId>
  <version>4.0.1</version>
</dependency>

<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-sofa</artifactId>
  <version>${project.version}</version>
</dependency>
<!-- apache shenYu sofa plugin end-->

```

9.4.2 Run the shenyu-examples-sofa project

Download [shenyu-examples-sofa](#), replace the register address in `spring-dubbo.xml` with your local zk address, such as:

```

com:
  alipay:
    sofa:
      rpc:
        registry-address: zookeeper://127.0.0.1:2181

```

Execute the `org.apache.shenyu.examples.sofa.service.TestSofaApplication` main method to start sofa service.

The following log appears when the startup is successful:

```

2021-02-10 02:31:45.599 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/insert","pathDesc":"Insert a row of data","rpcType":"sofa",
"serviceName":"org.dromara.shenyu.examples.sofa.api.service.SofaSingleParamService
","methodName":"insert","ruleName":"/sofa/insert","parameterTypes":"org.dromara.
shenyu.examples.sofa.api.entity.SofaSimpleTypeBean","rpcExt":{"loadbalance":"\
"hash","\retries":3,"timeout":-1},"enabled":true}

```

```

2021-02-10 02:31:45.605 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/findById","pathDesc":"Find by Id","rpcType":"sofa","serviceName
":"org.dromara.shenyu.examples.sofa.api.service.SofaSingleParamService","methodName
":"findById","ruleName":"/sofa/findById","parameterTypes":"java.lang.String",
"rpcExt":{"loadbalance":"hash","retries":3,"timeout":-1},"enabled":true}
2021-02-10 02:31:45.611 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/findAll","pathDesc":"Get all data","rpcType":"sofa",
"serviceName":"org.dromara.shenyu.examples.sofa.api.service.SofaSingleParamService
","methodName":"findAll","ruleName":"/sofa/findAll","parameterTypes":"","rpcExt":
{"loadbalance":"hash","retries":3,"timeout":-1},"enabled":true}
2021-02-10 02:31:45.616 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/batchSaveNameAndId","pathDesc":"","rpcType":"sofa","serviceName
":"org.dromara.shenyu.examples.sofa.api.service.SofaMultiParamService","methodName
":"batchSaveNameAndId","ruleName":"/sofa/batchSaveNameAndId","parameterTypes":
"java.util.List,java.lang.String,java.lang.String#org.dromara.shenyu.examples.sofa.
api.entity.SofaSimpleTypeBean","rpcExt":{"loadbalance":"hash","retries":3,"
timeout":-1},"enabled":true}
2021-02-10 02:31:45.621 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/saveComplexBeanAndName","pathDesc":"","rpcType":"sofa",
"serviceName":"org.dromara.shenyu.examples.sofa.api.service.SofaMultiParamService",
"methodName":"saveComplexBeanAndName","ruleName":"/sofa/saveComplexBeanAndName",
"parameterTypes":"org.dromara.shenyu.examples.sofa.api.entity.SofaComplexTypeBean,
java.lang.String","rpcExt":{"loadbalance":"hash","retries":3,"timeout":-1}
","enabled":true}
2021-02-10 02:31:45.627 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/findByIdsAndName","pathDesc":"","rpcType":"sofa",
"serviceName":"org.dromara.shenyu.examples.sofa.api.service.SofaMultiParamService",
"methodName":"findByIdsAndName","ruleName":"/sofa/findByIdsAndName",
"parameterTypes":"[Ljava.lang.Integer;java.lang.String","rpcExt":{"loadbalance\
":"hash","retries":3,"timeout":-1},"enabled":true}
2021-02-10 02:31:45.632 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/findByIdsAndName","pathDesc":"","rpcType":"sofa","serviceName
":"org.dromara.shenyu.examples.sofa.api.service.SofaMultiParamService","methodName
":"findByIdsAndName","ruleName":"/sofa/findByIdsAndName","parameterTypes":
"[Ljava.lang.String;","rpcExt":{"loadbalance":"hash","retries":3,"timeout\
":-1},"enabled":true}
2021-02-10 02:31:45.637 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/saveTwoList","pathDesc":"","rpcType":"sofa","serviceName":"org.
dromara.shenyu.examples.sofa.api.service.SofaMultiParamService","methodName":
"saveTwoList","ruleName":"/sofa/saveTwoList","parameterTypes":"java.util.List,java.
util.Map#org.dromara.shenyu.examples.sofa.api.entity.SofaComplexTypeBean","rpcExt":
{"loadbalance":"hash","retries":3,"timeout":-1},"enabled":true}

```

```

2021-02-10 02:31:45.642 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/batchSave","pathDesc":"","rpcType":"sofa","serviceName":"org.
dromara.shenyu.examples.sofa.api.service.SofaMultiParamService","methodName":
"batchSave","ruleName":"/sofa/batchSave","parameterTypes":"java.util.List#org.
dromara.shenyu.examples.sofa.api.entity.SofaSimpleTypeBean","rpcExt":{"\
"loadbalance\":"hash","\retries\":3,"\timeout\":-1},"enabled":true}
2021-02-10 02:31:45.647 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/findById","pathDesc":"","rpcType":"sofa","serviceName":
"org.dromara.shenyu.examples.sofa.api.service.SofaMultiParamService","methodName":
"findById","ruleName":"/sofa/findById","parameterTypes":"java.util.List",
"rpcExt":{"\loadbalance\":"hash","\retries\":3,"\timeout\":-1},"enabled":true}
2021-02-10 02:31:45.653 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/saveComplexBean","pathDesc":"","rpcType":"sofa","serviceName":
"org.dromara.shenyu.examples.sofa.api.service.SofaMultiParamService","methodName":
"saveComplexBean","ruleName":"/sofa/saveComplexBean","parameterTypes":"org.dromara.
shenyu.examples.sofa.api.entity.SofaComplexTypeBean","rpcExt":{"\loadbalance\":"
hash","\retries\":3,"\timeout\":-1},"enabled":true}
2021-02-10 02:31:45.660 INFO 2156 --- [pool-1-thread-1] o.d.s.client.common.utils.
RegisterUtils : sofa client register success: {"appName":"sofa","contextPath":"/
sofa","path":"/sofa/findByIdsAndName","pathDesc":"","rpcType":"sofa","serviceName":
"org.dromara.shenyu.examples.sofa.api.service.SofaMultiParamService","methodName":
"findByIdsAndName","ruleName":"/sofa/findByIdsAndName","parameterTypes":"java.util.
List,java.lang.String","rpcExt":{"\loadbalance\":"hash","\retries\":3,"\timeout\
":-1},"enabled":true}
2021-02-10 02:31:46.055 INFO 2156 --- [ main] o.a.c.f.imps.
CuratorFrameworkImpl : Starting
2021-02-10 02:31:46.059 INFO 2156 --- [ main] org.apache.zookeeper.
ZooKeeper : Client environment:zookeeper.version=3.4.6-1569965, built on
02/20/2014 09:09 GMT
2021-02-10 02:31:46.059 INFO 2156 --- [ main] org.apache.zookeeper.
ZooKeeper : Client environment:host.name=host.docker.internal
2021-02-10 02:31:46.059 INFO 2156 --- [ main] org.apache.zookeeper.
ZooKeeper : Client environment:java.version=1.8.0_211
2021-02-10 02:31:46.059 INFO 2156 --- [ main] org.apache.zookeeper.
ZooKeeper : Client environment:java.vendor=Oracle Corporation
2021-02-10 02:31:46.059 INFO 2156 --- [ main] org.apache.zookeeper.
ZooKeeper : Client environment:java.home=C:\Program Files\Java\jdk1.8.0_
211\jre
2021-02-10 02:31:46.059 INFO 2156 --- [ main] org.apache.zookeeper.
ZooKeeper : Client environment:java.class.path=C:\Program Files\Java\
jdk1.8.0_211\jre\lib\charsets.jar;C:\Program Files\Java\jdk1.8.0_211\jre\lib\
deploy.jar;C:\Program Files\Java\jdk1.8.0_211\jre\lib\ext\access-bridge-64.jar;C:\
Program Files\Java\jdk1.8.0_211\jre\lib\ext\cldrdata.jar;C:\Program Files\Java\
jdk1.8.0_211\jre\lib\ext\dnsns.jar;C:\Program Files\Java\jdk1.8.0_211\jre\lib\ext\
jaccess.jar;C:\Program Files\Java\jdk1.8.0_211\jre\lib\ext\jfxrt.jar;C:\Program
Files\Java\jdk1.8.0_211\jre\lib\ext\localedata.jar;C:\Program Files\Java\jdk1.8.0_
211\jre\lib\ext\nashorn.jar;C:\Program Files\Java\jdk1.8.0_211\jre\lib\ext\sunec.
94;C:\Program Files\Java\jdk1.8.0_211\jre\lib\ext\sunjcce_provider.jar;C:\Program
Files\Java\jdk1.8.0_211\jre\lib\ext\sunmscapi.jar;C:\Program Files\Java\jdk1.8.0_
211\jre\lib\ext\sunpkcs11.jar;C:\Program Files\Java\jdk1.8.0_211\jre\lib\ext\zipfs.
jar;C:\Program Files\Java\jdk1.8.0_211\jre\lib\javaws.jar;C:\Program Files\Java\

```

```

2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:java.library.path=C:\Program Files\Java\
jdk1.8.0_211\bin;C:\Windows\Sun\Java\bin;C:\Windows\system32;C:\Windows;C:\Program
Files\Common Files\Oracle\Java\javapath;C:\ProgramData\Oracle\Java\javapath;C:\
Program Files (x86)\Common Files\Oracle\Java\javapath;C:\Windows\system32;C:\
Windows;C:\Windows\System32\Wbem;C:\Windows\System32\WindowsPowerShell\v1.0\;C:\
Windows\System32\OpenSSH\;C:\Program Files\Java\jdk1.8.0_211\bin;C:\Program Files\
Java\jdk1.8.0_211\jre\bin;D:\SOFT\apache-maven-3.5.0\bin;C:\Program Files\Go\bin;
C:\Program Files\nodejs\;C:\Program Files\Python\Python38\;C:\Program Files\
OpenSSL-Win64\bin;C:\Program Files\Git\bin;D:\SOFT\protobuf-2.5.0\src;D:\SOFT\zlib-
1.2.8;c:\Program Files (x86)\Microsoft SQL Server\100\Tools\Binn\;c:\Program Files\
Microsoft SQL Server\100\Tools\Binn\;c:\Program Files\Microsoft SQL Server\100\DTS\
Binn\;C:\Program Files\ Docker\ Docker\resources\bin;C:\ProgramData\DockerDesktop\
version-bin;D:\SOFT\gradle-6.0-all\gradle-6.0\bin;C:\Program Files\mingw-w64\x86_
64-8.1.0-posix-seh-rt_v6-rev0\mingw64\bin;D:\SOFT\hugo_extended_0.55.5_Windows-
64bit;C:\Users\DLM\AppData\Local\Microsoft\WindowsApps;C:\Users\DLM\go\bin;C:\
Users\DLM\AppData\Roaming\npm;;C:\Program Files\Microsoft VS Code\bin;C:\Program
Files\nimbella-cli\bin;.
2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:java.io.tmpdir=C:\Users\DLM\AppData\Local\
Temp\
2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:java.compiler=<NA>
2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:os.name=Windows 10
2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:os.arch=amd64
2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:os.version=10.0
2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:user.name=DLM
2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:user.home=C:\Users\DLM
2021-02-10 02:31:46.060 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Client environment:user.dir=D:\X\dml_github\shenyu
2021-02-10 02:31:46.061 INFO 2156 --- [          main] org.apache.zookeeper.
ZooKeeper          : Initiating client connection, connectString=127.0.0.1:21810
sessionTimeout=60000 watcher=org.apache.curator.ConnectionState@3e850122
2021-02-10 02:31:46.069 INFO 2156 --- [27.0.0.1:21810] org.apache.zookeeper.
ClientCnxn          : Opening socket connection to server 127.0.0.1/127.0.0.
1:21810. Will not attempt to authenticate using SASL (unknown error)
2021-02-10 02:31:46.071 INFO 2156 --- [27.0.0.1:21810] org.apache.zookeeper.
ClientCnxn          : Socket connection established to 127.0.0.1/127.0.0.1:21810,
initiating session
2021-02-10 02:31:46.078 INFO 2156 --- [27.0.0.1:21810] org.apache.zookeeper.
ClientCnxn          : Session establishment complete on server 127.0.0.1/127.0.0.
1:21810, sessionId = 0x10005b0d05e0001, negotiated timeout = 40000
2021-02-10 02:31:46.081 INFO 2156 --- [ain-EventThread] o.a.c.f.state.
ConnectionStateManager : State change: CONNECTED

```

```
2021-02-10 02:31:46.093 WARN 2156 --- [main] org.apache.curator.utils.ZKPaths : The version of ZooKeeper being used doesn't support Container nodes. CreateMode.PERSISTENT will be used instead.
2021-02-10 02:31:46.141 INFO 2156 --- [main] o.d.s.e.s.service.TestSofaApplication : Started TestSofaApplication in 3.41 seconds (JVM running for 4.423)
```

9.4.3 Test

The shenyu-examples-sofa project will automatically register interface methods annotated with @ShenyuSofaClient in the Apache ShenYu gateway after successful startup.

Open PluginList -> rpc proxy -> sofa to see the list of plugin rule configurations:

SelectorList			RulesList			
			Synchronous sofa			
Name	Open	Operation	RuleName	Open	UpdateTime	Operation
/sofa	Open	Modify Delete	/sofa/insert	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/findById	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/findAll	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/batchSaveNameAndId	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/saveComplexBeanAndName	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/findByArrayIdsAndName	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/findByStringArray	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/saveTwoList	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/batchSave	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/findByIdsAndName	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/saveComplexBean	Open	2021-02-10 02:16:12	Modify Delete
			/sofa/findById	Open	2021-02-10 02:16:12	Modify Delete

Use PostMan to simulate HTTP to request your Sofa service:

POST http://localhost:9195/sofa/findById

Authorization Headers (1) Body Pre-request Script Tests

form-data x-www-form-urlencoded raw binary JSON (application/json)

```
1 {
2   "id": "123"
3 }
4
```

Body Cookies Headers (2) Test Results Status: 200 OK Time: 954 ms

Pretty Raw Preview JSON

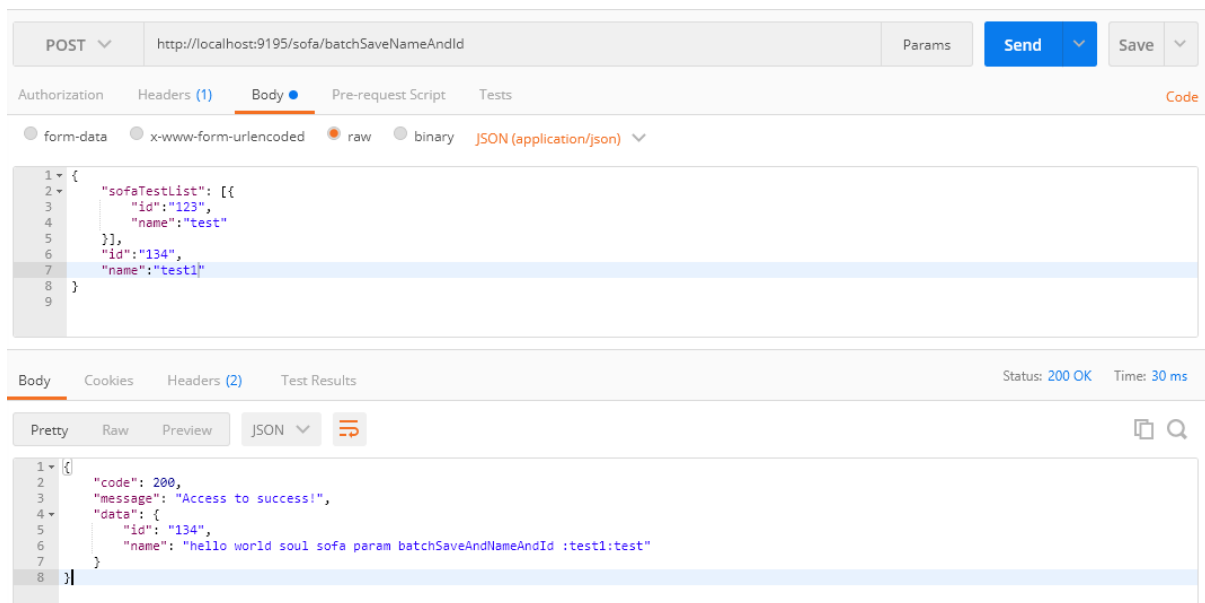
```
1 {
2   "code": 200,
3   "message": "Access to success!",
4   "data": {
5     "id": "123",
6     "name": "hello world Soul Sofa, findById"
7   }
8 }
```

Complex multi-parameter example: The related interface implementation class is org.apache.shenyu.examples.sofa.service.impl.SofaMultiParamServiceImpl#batchSaveNameAndId

```

@Override
@ShenyuSofaClient(path = "/batchSaveNameAndId")
public SofaSimpleTypeBean batchSaveNameAndId(final List<SofaSimpleTypeBean>
sofaTestList, final String id, final String name) {
    SofaSimpleTypeBean simpleTypeBean = new SofaSimpleTypeBean();
    simpleTypeBean.setId(id);
    simpleTypeBean.setName("hello world shenyu sofa param batchSaveAndNameAndId : "
+ name + ":" + sofaTestList.stream().map(SofaSimpleTypeBean::getName).
collect(Collectors.joining("-")));
    return simpleTypeBean;
}

```



9.5 Quick start with gRPC

This document introduces how to quickly access the Apache ShenYu gateway using gRPC. You can get the code example of this document by clicking [here](#).

9.5.1 Prepare For Environment

Please refer to the deployment to select a way to start shenyu-admin. For example, start the Apache ShenYu gateway management system through [local deployment](#).

After successful startup, you need to open the gRPC plugin on in the BasicConfig -> Plugin.

If you are a startup gateway by means of source, can be directly run the ShenYuBootstrapApplication of shenyu-bootstrap module.

Note: Before starting, make sure the gateway has added dependencies.

Add the following dependencies to the gateway's pom.xml file:

```

<!-- apache shenyu grpc plugin start-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-grpc</artifactId>
  <version>${project.version}</version>
</dependency>
<!-- apache shenyu grpc plugin end-->

```

9.5.2 Run the shenyu-examples-grpc project

Download [shenyu-examples-grpc](#)

Run the following command under shenyu-examples-grpc to generate Java code:

```

mvn protobuf:compile
mvn protobuf:compile-custom

```

Execute the `org.apache.shenyu.examples.grpc.ShenyuTestGrpcApplication` main method to start project.

The following log appears when the startup is successful:

```

2021-06-18 19:33:32.866 INFO 11004 --- [or_consumer_-19] o.a.s.r.client.http.
utils.RegisterUtils : grpc client register success: {"appName":"127.0.0.1:8080",
"contextPath":"/grpc","path":"/grpc/clientStreamingFun","pathDesc":
"clientStreamingFun","rpcType":"grpc","serviceName":"stream.StreamService",
"methodName":"clientStreamingFun","ruleName":"/grpc/clientStreamingFun",
"parameterTypes":"io.grpc.stub.StreamObserver","rpcExt":{"timeout\":"5000,\
"methodType\":"CLIENT_STREAMING\"},"enabled":true,"host":"172.20.10.6","port
":8080,"registerMetaData":false}
2021-06-18 19:33:32.866 INFO 11004 --- [or_consumer_-17] o.a.s.r.client.http.
utils.RegisterUtils : grpc client register success: {"appName":"127.0.0.1:8080",
"contextPath":"/grpc","path":"/grpc/echo","pathDesc":"echo","rpcType":"grpc",
"serviceName":"echo.EchoService","methodName":"echo","ruleName":"/grpc/echo",
"parameterTypes":"echo.EchoRequest,io.grpc.stub.StreamObserver","rpcExt":{"\
"timeout\":"5000,\\"methodType\":"UNARY\"},"enabled":true,"host":"172.20.10.6",
"port":8080,"registerMetaData":false}
2021-06-18 19:33:32.866 INFO 11004 --- [or_consumer_-20] o.a.s.r.client.http.
utils.RegisterUtils : grpc client register success: {"appName":"127.0.0.1:8080",
"contextPath":"/grpc","path":"/grpc/bidiStreamingFun","pathDesc":"bidiStreamingFun",
"rpcType":"grpc","serviceName":"stream.StreamService","methodName":
"bidiStreamingFun","ruleName":"/grpc/bidiStreamingFun","parameterTypes":"io.grpc.
stub.StreamObserver","rpcExt":{"timeout\":"5000,\\"methodType\":"BIDI_STREAMING\"}
","enabled":true,"host":"172.20.10.6","port":8080,"registerMetaData":false}
2021-06-18 19:33:32.866 INFO 11004 --- [or_consumer_-21] o.a.s.r.client.http.
utils.RegisterUtils : grpc client register success: {"appName":"127.0.0.1:8080",
"contextPath":"/grpc","path":"/grpc/unaryFun","pathDesc":"unaryFun","rpcType":"grpc",
"serviceName":"stream.StreamService","methodName":"unaryFun","ruleName":"/grpc/
unaryFun","parameterTypes":"stream.RequestData,io.grpc.stub.StreamObserver","rpcExt
":{"timeout\":"5000,\\"methodType\":"UNARY\"},"enabled":true,"host":"172.20.10.6
","registerMetaData":false}

```



```
2021-06-18 19:33:32.866 INFO 11004 --- [or_consumer_-18] o.a.s.r.client.http.
utils.RegisterUtils : grpc client register success: {"appName":"127.0.0.1:8080",
"contextPath":"/grpc","path":"/grpc/serverStreamingFun","pathDesc":
"serverStreamingFun","rpcType":"grpc","serviceName":"stream.StreamService",
"methodName":"serverStreamingFun","ruleName":"/grpc/serverStreamingFun",
"parameterTypes":"stream.RequestData,io.grpc.stub.StreamObserver","rpcExt":{"\
"timeout\":"5000","\methodType\":"SERVER_STREAMING\"},"enabled":true,"host":"172.
20.10.6","port":8080,"registerMetaData":false}
```

9.5.3 Test

The shenyu-examples-grpc project will automatically register interface methods annotated with @ShenyuGrpcClient in the Apache ShenYu gateway after successful startup.

Open PluginList -> rpc proxy -> gRPC to see the list of plugin rule configurations:

Selector	N..	Query	Add	RulesList	Synchronous grpc	RuleName	Query	Add
Name	Open	Operation		RuleName	Open	UpdateTime	Operation	
/grpc	Open	Modify Delete		/grpc/unaryFun	Open	2021-06-18 13:27:36	Modify Delete	
				/grpc/serverStreamingFun	Open	2021-06-18 13:27:37	Modify Delete	
				/grpc/clientStreamingFun	Open	2021-06-18 13:27:37	Modify Delete	
				/grpc/bidiStreamingFun	Open	2021-06-18 13:27:37	Modify Delete	
				/grpc/echo	Open	2021-06-18 13:27:37	Modify Delete	

Use postman to simulate http to request your gRPC service. The following is the request body.

```
{
  "data": [
    {
      "message": "hello grpc"
    }
  ]
}
```


The screenshot shows a REST client interface with the following details:

- Method:** POST
- URL:** http://localhost:9195/grpc/echo
- Body:** `{ "data": [{ "message": "hello grpc" }] }`
- Response:**

```

1 {
2   "code": 200,
3   "message": "Access to success!",
4   "data": [
5     {
6       "message": "ReceivedHELLO",
7       "traces": [ { "host": "LAPTOP-7P4PA12J(172.20.10.6)" } ]
8     }
9   ]
10 }

```
- Status:** 200 OK, Time: 16 ms, Size: 238 B

The parameters are passed in json format. The name of the key is data by default, and you can reset it in `GrpcConstants.JSON_DESCRIPTOR_PROTO_FIELD_NAME`. The input of value is based on the proto file defined by you.

9.5.4 Streaming

the Apache ShenYu can support streaming of gRPC. The following shows the calls of the four method types of gRPC. In streaming, you can pass multiple parameters in the form of an array.

- UNARY

The request body like this.

```

{
  "data": [
    {
      "text": "hello grpc"
    }
  ]
}

```

Then, call gRPC service by UNARY method type.

POST ▼ http://localhost:9195/grpc/unaryFun Send ▼

Params Authorization Headers (9) **Body** Pre-request Script Tests Settings

☐ none ☐ form-data ☐ x-www-form-urlencoded ☒ raw ☐ binary ☐ GraphQL **JSON** ▼

```
1 [{"data": [{"text": "hello grpc"}]}]
```

Body Cookies Headers (2) Test Results 🌐 Status: 200 OK Time: 26 ms Size: 178 B Save

Pretty Raw Preview Visualize **JSON** ▼ ≡

```
1 {
2   "code": 200,
3   "message": "Access to success!",
4   "data": [
5     "{\\n  \\text\\": \\\"unaryFun response: hello gRPC\\\"\\n}"
6   ]
7 }
```

- CLIENT_STREAMING

The request body like this.

```
{
  "data": [
    {
      "text": "hello grpc"
    },
    {
      "text": "hello grpc"
    },
    {
      "text": "hello grpc"
    }
  ]
}
```

Then, call gRPC service by CLIENT_STREAMING method type.

The screenshot shows a REST client interface. At the top, a POST request is configured to `http://localhost:9195/grpc/clientStreamingFun`. The 'Body' tab is selected, showing a JSON array of three objects, each with a 'text' property set to 'hello grpc'. Below the request, the 'Body' tab of the response is selected, displaying a JSON object with 'code': 200, 'message': 'Access to success!', and 'data': an array of one object containing 'text': 'clientStreamingFun onCompleted'.

```

1 {"data":[{"text":"hello grpc"}, {"text":"hello grpc"}, {"text":"hello grpc"}]}

```

```

1 {
2   "code": 200,
3   "message": "Access to success!",
4   "data": [
5     "{\n  \"text\": \"clientStreamingFun onCompleted\"\n}"
6   ]
7 }

```

- SERVER_STREAMING

The request body like this.

```

{
  "data": [
    {
      "text": "hello grpc"
    }
  ]
}

```

Then, call gRPC service by SERVER_STREAMING method type.

POST http://localhost:9195/grpc/serverStreamingFun

Params Authorization Headers (9) **Body** Pre-request Script Tests Settings

none form-data x-www-form-urlencoded raw binary GraphQL **JSON**

1 [{"data":[{"text":"hello grpc"}]}]

Body Cookies Headers (2) Test Results Status: 200 OK Time: 25 ms Size: 734 B Sa

Pretty Raw Preview Visualize JSON

```

2    "code": 200,
3    "message": "Access to success!",
4    "data": [
5      "{\n  \"text\": \"serverStreamingFun response: hello 0\\n\"}",
6      "{\n  \"text\": \"serverStreamingFun response: hello 1\\n\"}",
7      "{\n  \"text\": \"serverStreamingFun response: hello 2\\n\"}",
8      "{\n  \"text\": \"serverStreamingFun response: hello 3\\n\"}",
9      "{\n  \"text\": \"serverStreamingFun response: hello 4\\n\"}",
10     "{\n  \"text\": \"serverStreamingFun response: hello 5\\n\"}",
11     "{\n  \"text\": \"serverStreamingFun response: hello 6\\n\"}",
12     "{\n  \"text\": \"serverStreamingFun response: hello 7\\n\"}",
13     "{\n  \"text\": \"serverStreamingFun response: hello 8\\n\"}",
14     "{\n  \"text\": \"serverStreamingFun response: hello 9\\n\"}"
15   ]
16 }

```

- BIDI_STREAMING

The request body like this.

```

{
  "data": [
    {
      "text": "hello grpc"
    },
    {
      "text": "hello grpc"
    },
    {
      "text": "hello grpc"
    }
  ]
}

```

Then, call gRPC service by BIDI_STREAMING method type.

POST http://localhost:9195/grpc/bidiStreamingFun

Params Authorization Headers (9) **Body** Pre-request Script Tests Settings

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {"data":[{"text":"hello grpc"}, {"text":"hello grpc"}, {"text":"hello grpc"}]}
```

Body Cookies Headers (2) Test Results

Status: 200 OK Time: 15 ms Size: 348 B Sav

Pretty Raw Preview Visualize JSON

```
1 {
2   "code": 200,
3   "message": "Access to success!",
4   "data": [
5     "{\n  \"text\": \"bidiStreamingFun response: hello\"\n}",
6     "{\n  \"text\": \"bidiStreamingFun response: hello\"\n}",
7     "{\n  \"text\": \"bidiStreamingFun response: hello\"\n}",
8     "{\n  \"text\": \"bidiStreamingFun onCompleted\"\n}"
9   ]
10 }
```

9.6 Quick start with Tars

This document introduces how to quickly access the Apache ShenYu Gateway using Tars. You can get the code example of this document by clicking [here](#).

9.6.1 Environment to prepare

Please refer to the deployment to select a way to start shenyu-admin. For example, start the Apache ShenYu gateway management system through [local deployment](#).

After successful startup, you need to open the Sofa plugin on in the BasicConfig -> Plugin.

If you are a startup gateway by means of source, can be directly run the ShenYuBootstrapApplication of shenyu-bootstrap module.

Note: Before starting, make sure the gateway has added dependencies.

shenyu-bootstrap need to import tars dependencies:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-tars</artifactId>
  <version>${project.version}</version>
</dependency>

<dependency>
  <groupId>com.tencent.tars</groupId>
```

```
<artifactId>tars-client</artifactId>
<version>1.7.2</version>
</dependency>
```

9.6.2 Run the shenyu-examples-tars project

Download [shenyu-examples-tars](#) .

Modify host in `application.yml` to be your local IP

Modify `config src/main/resources/ShenyuExampleServer.ShenyuExampleApp.config.conf`:

- It is recommended to make clear the meaning of the main configuration items of config, [refer to the development guide](#)
- bind IP in config should pay attention to providing cost machine
- `local=...`, Indicates the open port that the native machine connects to the tarsnode. If there is no tarsnode, this configuration can be dropped
- `locator`: Indicates the address (frame address) of the main control center, which is used to obtain the IP list according to the service name, If Registry is not required to locate the service, this configuration can be dropped
- `node=tars.tarsnode.ServerObj@xxxx`, Indicates the address of the connected tarsnode. If there is no tarsnode locally, this configuration can be removed

More config configuration instructions, Please refer to [TARS Official Documentation](#)

Execute the `org.apache.shenyu.examples.tars.ShenyuTestTarsApplication main` method to start project.

Note: The configuration file address needs to be specified in the startup command when the service starts **-Dconfig=xxx/ShenyuExampleServer.ShenyuExampleApp.config.conf**

If the `-Dconfig` parameter is not added, the configuration may throw the following exceptions:

```
com.qq.tars.server.config.ConfigurationException: error occurred on load server
config
    at com.qq.tars.server.config.ConfigurationManager.
loadServerConfig(ConfigurationManager.java:113)
    at com.qq.tars.server.config.ConfigurationManager.init(ConfigurationManager.
java:57)
    at com.qq.tars.server.core.Server.loadServerConfig(Server.java:90)
    at com.qq.tars.server.core.Server.<init>(Server.java:42)
    at com.qq.tars.server.core.Server.<clinit>(Server.java:38)
    at com.qq.tars.spring.bean.PropertiesListener.
onApplicationEvent(PropertiesListener.java:37)
    at com.qq.tars.spring.bean.PropertiesListener.
onApplicationEvent(PropertiesListener.java:31)
    at org.springframework.context.event.SimpleApplicationEventMulticaster.
doInvokeListener(SimpleApplicationEventMulticaster.java:172)
```

```

    at org.springframework.context.event.SimpleApplicationEventMulticaster.
    invokeListener(SimpleApplicationEventMulticaster.java:165)
    at org.springframework.context.event.SimpleApplicationEventMulticaster.
    multicastEvent(SimpleApplicationEventMulticaster.java:139)
    at org.springframework.context.event.SimpleApplicationEventMulticaster.
    multicastEvent(SimpleApplicationEventMulticaster.java:127)
    at org.springframework.boot.context.event.EventPublishingRunListener.
    environmentPrepared(EventPublishingRunListener.java:76)
    at org.springframework.boot.SpringApplicationRunListeners.
    environmentPrepared(SpringApplicationRunListeners.java:53)
    at org.springframework.boot.SpringApplication.
    prepareEnvironment(SpringApplication.java:345)
    at org.springframework.boot.SpringApplication.run(SpringApplication.java:308)
    at org.springframework.boot.SpringApplication.run(SpringApplication.java:1226)
    at org.springframework.boot.SpringApplication.run(SpringApplication.java:1215)
    at org.apache.shenyu.examples.tars.ShenyuTestTarsApplication.
    main(ShenyuTestTarsApplication.java:38)
Caused by: java.lang.NullPointerException
    at java.io.FileInputStream.<init>(FileInputStream.java:130)
    at java.io.FileInputStream.<init>(FileInputStream.java:93)
    at com.qq.tars.common.util.Config.parseFile(Config.java:211)
    at com.qq.tars.server.config.ConfigurationManager.
    loadServerConfig(ConfigurationManager.java:63)
    ... 17 more
The exception occurred at load server config

```

The following log appears when the startup is successful:

```

[SERVER] server starting at tcp -h 127.0.0.1 -p 21715 -t 60000...
[SERVER] server started at tcp -h 127.0.0.1 -p 21715 -t 60000...
[SERVER] server starting at tcp -h 127.0.0.1 -p 21714 -t 3000...
[SERVER] server started at tcp -h 127.0.0.1 -p 21714 -t 3000...
[SERVER] The application started successfully.
The session manager service started...
[SERVER] server is ready...
2021-02-09 13:28:24.643 INFO 16016 --- [          main] o.s.b.w.embedded.tomcat.
TomcatWebServer : Tomcat started on port(s): 55290 (http) with context path ''
2021-02-09 13:28:24.645 INFO 16016 --- [          main] o.d.s.e.tars.
ShenyuTestTarsApplication : Started ShenyuTestTarsApplication in 4.232 seconds
(JVM running for 5.1)
2021-02-09 13:28:24.828 INFO 16016 --- [pool-2-thread-1] o.d.s.client.common.
utils.RegisterUtils : tars client register success: {"appName":"127.0.0.1:21715",
"contextPath":"/tars","path":"/tars/helloInt","pathDesc":"","rpcType":"tars",
"serviceName":"ShenyuExampleServer.ShenyuExampleApp.HelloObj","methodName":
"helloInt","ruleName":"/tars/helloInt","parameterTypes":"int,java.lang.String",
"rpcExt":{"methodInfo":{"methodName":"helloInt","params":{"{}","{}"},"
returnType":"java.lang.Integer"},"methodName":"hello","params":{"{}","{}"},"
returnType":"java.lang.String"}},"enabled":true}

```

```
2021-02-09 13:28:24.837 INFO 16016 --- [pool-2-thread-1] o.d.s.client.common.
utils.RegisterUtils : tars client register success: {"appName":"127.0.0.1:21715",
"contextPath":"/tars","path":"/tars/hello","pathDesc":"","rpcType":"tars",
"serviceName":"ShenyuExampleServer.ShenyuExampleApp.HelloObj","methodName":"hello",
"ruleName":"/tars/hello","parameterTypes":"int,java.lang.String","rpcExt":{"\
"methodInfo":[{"methodName":"helloInt","\params":[{"},{}],\returnType":"\
"java.lang.Integer"},{"methodName":"hello","\params":[{"},{}],\returnType":"\
"java.lang.String"}]},"enabled":true}
```

9.6.3 Test

The shenyu-examples-tars project will automatically register interface methods annotated with `@ShenyuTarsClient` in the Apache ShenYu gateway after successful startup.

Open PluginList -> rpc proxy -> tars to see the list of plugin rule configurations:

SelectorList			RulesList			
Name	Open	Operation	RuleName	Open	UpdateTime	Operation
/tars	Open	Modify Delete	/tars/helloInt	Open	2021-02-09 13:15:27	Modify Delete
			/tars/hello	Open	2021-02-09 13:15:27	Modify Delete

Use PostMan to simulate HTTP to request your tars service:

POST http://localhost:9195/tars/hello

Params Send Save

Authorization Headers (1) Body Pre-request Script Tests Code

form-data x-www-form-urlencoded raw binary JSON (application/json)

```

1 {
2   "no": "123",
3   "name": "test"
4 }
5

```

Body Cookies Headers (2) Test Results Status: 200 OK Time: 30 ms

Pretty Raw Preview JSON

```

1 {
2   "code": 200,
3   "message": "Access to success!",
4   "data": "hello no=123, name=test, time=1612867753446"
5 }

```


9.7 Quick start with Motan

This document introduces how to quickly access the Apache ShenYu gateway using Motan RPC. You can get the code example of this document by clicking [here](#).

9.7.1 Environment to prepare

Please refer to the deployment to select a way to start shenyu-admin. For example, start the Apache ShenYu gateway management system through [local deployment](#).

After successful startup, you need to open the Sofa plugin on in the BasicConfig -> Plugin.

If you are a startup gateway by means of source, can be directly run the ShenYuBootstrapApplication of shenyu-bootstrap module.

Note: Before starting, make sure the gateway has added dependencies.

Start up zookeeper in local.

Import the gateway proxy plugin for Motan and add the following dependencies to the gateway's pom.xml file:

```
<!-- apache shenyu motan plugin -->
<dependency>
    <groupId>org.apache.shenyu</groupId>
    <artifactId>shenyu-spring-boot-starter-plugin-motan</artifactId>
    <version>${project.version}</version>
</dependency>

<dependency>
    <groupId>com.weibo</groupId>
    <artifactId>motan-core</artifactId>
    <version>1.1.9</version>
</dependency>

<dependency>
    <groupId>com.weibo</groupId>
    <artifactId>motan-registry-zookeeper</artifactId>
    <version>1.1.9</version>
</dependency>

<dependency>
    <groupId>com.weibo</groupId>
    <artifactId>motan-transport-netty4</artifactId>
    <version>1.1.9</version>
</dependency>

<dependency>
    <groupId>com.weibo</groupId>
```

```
<artifactId>motan-springsupport</artifactId>
<version>1.1.9</version>
</dependency>
```

9.7.2 Run the shenyu-examples-motan project

Download [shenyu-examples-motan](#) .

Run `main` method of `org.apache.shenyu.examples.motan.service.TestMotanApplication` to start this project.

log info as follows after starting:

```
2021-07-18 16:46:25.388 INFO 96 --- [main] o.s.b.w.embedded.tomcat.
TomcatWebServer : Tomcat started on port(s): 8081 (http) with context path ''
2021-07-18 16:46:25.393 INFO 96 --- [main] o.a.s.e.m.service.
TestMotanApplication : Started TestMotanApplication in 3.89 seconds (JVM running
for 4.514)
2021-07-18 16:46:25.396 INFO 96 --- [main] info
: [ZookeeperRegistry] Url (null) will set to available to Registry
[zookeeper://localhost:2181/default_rpc/com.weibo.api.motan.registry.
RegistryService/1.0/service]
2021-07-18 16:46:25.399 INFO 96 --- [Thread-6] o.a.s.c.c.s.
ShenyuClientShutdownHook : hook Thread-0 will sleep 3000ms when it start
2021-07-18 16:46:25.399 INFO 96 --- [Thread-6] o.a.s.c.c.s.
ShenyuClientShutdownHook : hook SpringContextShutdownHook will sleep 3000ms
when it start
2021-07-18 16:46:25.445 INFO 96 --- [ntLoopGroup-3-2] info
: NettyChannelHandler channelActive: remote=/192.168.1.8:49740 local=/
192.168.1.8:8002
2021-07-18 16:46:25.445 INFO 96 --- [ntLoopGroup-3-1] info
: NettyChannelHandler channelActive: remote=/192.168.1.8:49739 local=/
192.168.1.8:8002
2021-07-18 16:46:25.925 INFO 96 --- [or_consumer_-17] o.a.s.r.client.http.utils.
RegisterUtils : motan client register success: {"appName":"motan","contextPath":"/
motan","path":"/motan/hello","pathDesc":"","rpcType":"motan","serviceName":"org.
apache.shenyu.examples.motan.service.MotanDemoService","methodName":"hello",
"ruleName":"/motan/hello","parameterTypes":"java.lang.String","rpcExt":{"\
"methodInfo":[{"methodName":"hello","params":[{"left":"java.lang.String\
","\right":"name"}]}],"group":"motan-shenyu-rpc"},"enabled":true,"host":
"192.168.220.1","port":8081,"registerMetaData":false}
```

9.7.3 Test

The shenyu-examples-motan project will automatically register the @ShenyuMotanClient annotated interface methods with the gateway and add selectors and rules. If not, you can manually add them.

Open PluginList -> rpc proxy -> motan to see the list of plugin rule configurations:

Use PostMan to simulate HTTP to request your Motan service:

10.1 Data Synchronization Config

This document focuses on how to use different data synchronization strategies. Data synchronization refers to the strategy used to synchronize data to ShenYu gateway after shenyu-admin background operation data. ShenYu gateway currently supports ZooKeeper, WebSocket, HTTP Long Polling, Nacos, Etcd and Consul for data synchronization.

For details about the data synchronization principles, see [Data Synchronization Design](#) in the design document.

10.1.1 WebSocket Synchronization Config (default strategy, recommend)

- Apache ShenYu gateway config

Add these dependencies in pom.xml:

```
<!-- apache shenyu data sync start use websocket-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-sync-data-websocket</artifactId>
  <version>${project.version}</version>
</dependency>
```

Add these config values in yaml file:

```
shenyu:
  sync:
    websocket :
      urls: ws://localhost:9095/websocket
      #urls: address of shenyu-admin, multi-address will be separated with (,).
```

- shenyu-admin config

Add these config values in yaml file:

```
shenyu:
  sync:
    websocket:
      enabled: true
```

After the connection is established, the data will be fully obtained once, and the subsequent data will be updated and added increments, with good performance. It also supports disconnection (default: 30 seconds). This mode is recommended for data synchronization and is the default data synchronization strategy of ShenYu.

10.1.2 Zookeeper Synchronization Config

- Apache ShenYu gateway config

Add these dependencies in pom.xml:

```
<!-- apache shenyu data sync start use zookeeper-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-sync-data-zookeeper</artifactId>
  <version>${project.version}</version>
</dependency>
```

Add these config values in yaml file:

```
shenyu:
  sync:
    zookeeper:
      url: localhost:2181
      #url: config with your zk address, used by the cluster environment,
      separated with (,).
      sessionTimeout: 5000
      connectionTimeout: 2000
```

- shenyu-admin config

Add these config values in yaml file:

```
shenyu:
  sync:
    zookeeper:
      url: localhost:2181
      #url: config with your zk address, used by the cluster environment,
      separated with (,).
      sessionTimeout: 5000
      connectionTimeout: 2000
```

It is a good idea to use ZooKeeper synchronization mechanism with high timeliness, but we also have to deal with the unstable environment of ZK, cluster brain splitting and other problems.

10.1.3 HTTP Long Polling Synchronization Config

- Apache ShenYu gateway config

Add these dependencies in pom.xml:

```
<!-- apache shenyu data sync start use http-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-sync-data-http</artifactId>
  <version>${project.version}</version>
</dependency>
```

Add these config values in yaml file:

```
shenyu:
  sync:
    http:
      url: http://localhost:9095
      #url: config your shenyu-admin ip and port, cluster IP by split by (,)
```

- shenyu-admin config

Add these config values in yaml file:

```
shenyu:
  sync:
    http:
      enabled: true
```

HTTP long-polling makes the gateway lightweight, but less time-sensitive. It pulls according to the group key, if the data is too large, it will have some influences, a small change under a group will pull the entire group.

10.1.4 Nacos Synchronization Config

- Apache ShenYu gateway config

Add these dependencies in pom.xml:

```
<!-- apache shenyu data sync start use nacos-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-sync-data-nacos</artifactId>
  <version>${project.version}</version>
</dependency>
```

Add these config values in yaml file:

```
shenyu:
  sync:
    nacos:
      url: localhost:8848
      # url: config with your nacos address, please use (,) to split your
cluster environment.
      namespace: 1c10d748-af86-43b9-8265-75f487d20c6c
      username:
      password:
      acm:
        enabled: false
        endpoint: acm.aliyun.com
        namespace:
        accessKey:
        secretKey:
      # other configure, please refer to the naocs website.
```

- shenyu-admin config

Add these config values in yaml file:

```
shenyu:
  sync:
    nacos:
      url: localhost:8848
      namespace: 1c10d748-af86-43b9-8265-75f487d20c6c
      username:
      password:
      acm:
        enabled: false
        endpoint: acm.aliyun.com
        namespace:
        accessKey:
        secretKey:
      # url: config with your nacos address, pls use (,) to split your cluster
environment.
      # other configure, pls refer to the naocs website.
```

10.1.5 Etcd Synchronization Config

- Apache ShenYu gateway config

Add these dependencies in pom.xml:

```
<!-- apache shenyu data sync start use etcd-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-sync-data-etcd</artifactId>
```

```

<version>${project.version}</version>
<exclusions>
  <exclusion>
    <groupId>io.grpc</groupId>
    <artifactId>grpc-grpclb</artifactId>
  </exclusion>
  <exclusion>
    <groupId>io.grpc</groupId>
    <artifactId>grpc-netty</artifactId>
  </exclusion>
</exclusions>
</dependency>

```

Add these config values in yaml file:

```

shenyu:
  sync:
    etcd:
      url: http://localhost:2379
      #url: config with your etcd address, used by the cluster environment,
      separated with (,).

```

- shenyu-admin config

Add these config values in yaml file:

```

shenyu:
  sync:
    etcd:
      url: http://localhost:2379
      #url: config with your etcd address, used by the cluster environment,
      separated with (,).

```

10.1.6 Consul Synchronization Config

- Apache ShenYu gateway config

Add these dependencies in pom.xml:

```

<!-- apache shenyu data sync start use consul-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-sync-data-consul</artifactId>
  <version>${project.version}</version>
</dependency>

```

Add these config values in yaml file:


```
shenyu:
  sync:
    consul:
      url: http://localhost:8500
      waitTime: 1000 # query wait time
      watchDelay: 1000 # Data synchronization interval
```

- shenyu-admin config

Add these config values in yaml file:

```
shenyu:
  sync:
    consul:
      url: http://localhost:8500
```

After the data synchronization strategy of Apache ShenYu gateway and shenyu-admin is reconfigured, the microservice needs to be restarted.

the Apache ShenYu gateway and shenyu-admin must use the same synchronization strategy.

10.2 Application Client Access Config

Application client access means to access your microservice to ShenYu gateway, currently supports HTTP, Dubbo, Spring Cloud, gRPC, Motan, Sofa, Tars and other protocols access.

Connecting the application client to ShenYu gateway is realized through the registration center, which involves the registration of the client and the synchronization of the server data. The registry supports HTTP, ZooKeeper, Etcd, Consul, and Nacos.

This article describes how to configure the application client to access the Apache ShenYu gateway. For related principles, see [Application Client Access](#) in the design document .

10.2.1 Http Registry Config

shenyu-admin config

Set the register type to ' Http in the yml file. The configuration information is as follows:

```
shenyu:
  register:
    registerType: http
    props:
      checked: true # is checked
      zombieCheckTimes: 5 # how many times does it fail to detect the service
      scheduledTime: 10 # timed detection interval time
```

shenyu-client config

The following shows the configuration information registered through Http when the Http service accesses the Apache ShenYu gateway as a client. Other clients (such as Dubbo and Spring Cloud) can be configured in the same way.

```
shenyu:
  client:
    registerType: http
    serverLists: http://localhost:9095
    props:
      contextPath: /http
      appName: http
      port: 8188
      isFull: false
# registerType : register type, set http
# serverList: when register type is http, set shenyu-admin address list, pls note
# 'http://' is necessary.
# port: your project port number; apply to springmvc/tars/grpc
# contextPath: your project's route prefix through shenyu gateway, such as /order ,
# /product etc, gateway will route based on it.
# appName: your project name,the default value is`spring.application.name`.
# isFull: set true means providing proxy for your entire service, or only a few
# controller. apply to springmvc/springcloud
```

10.2.2 Zookeeper Registry Config

shenyu-admin config

First add the related dependencies to the pom file (already added by default) :

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-register-server-zookeeper</artifactId>
  <version>${project.version}</version>
</dependency>
```

- In the yml file, set the register type to zookeeper and enter the service address and parameters of zookeeper. The configuration information is as follows:

```
shenyu:
  register:
    registerType: zookeeper
    serverLists: localhost:2181
    props:
      sessionTimeout: 5000
      connectionTimeout: 2000
```

shenyu-client config

The following shows the configuration information registered by zookeeper when the Http service accesses the Apache ShenYu gateway as a client. Other clients (such as Dubbo and Spring Cloud) can be configured in the same way.

- First add dependencies to the pom file:

```
<!-- apache shenyu zookeeper register center -->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-register-server-zookeeper</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

- Then set the register type to zookeeper in yml and enter the service address and related parameters as follows:

```
shenyu:
  client:
    registerType: zookeeper
    serverLists: localhost:2181
    props:
      contextPath: /http
      appName: http
      port: 8189
      isFull: false
# registerType : register type, set zookeeper
# serverList: when register type is zookeeper, set zookeeper address list
# port: your project port number; apply to springmvc/tars/grpc
# contextPath: your project's route prefix through shenyu gateway, such as /order ,
# /product etc, gateway will route based on it.
# appName: your project name,the default value is`spring.application.name`.
# isFull: set true means providing proxy for your entire service, or only a few
# controller. apply to springmvc/springcloud
```

10.2.3 Etcd Registry Config

shenyu-admin config

First add the related dependencies to the pom file (already added by default) :

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-register-server-etcd</artifactId>
  <version>${project.version}</version>
</dependency>
```

- Then set register type to etcd in yml and enter etcd service address and parameters. The configuration information is as follows:

```
shenyu:
  register:
    registerType: etcd
    serverLists : http://localhost:2379
  props:
    etcdTimeout: 5000
    etcdTTL: 5
```

shenyu-client config

The following shows the configuration information registered by Etcd when the Http service accesses the Apache ShenYu gateway as a client. Other clients (such as Dubbo and Spring Cloud) can be configured in the same way.

- First add dependencies to the pom file:

```
<!-- apache shenyu etcd register center -->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-register-server-etcd</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

- Then set the register type to etcd in yml and enter the etcd service address and related parameters as follows:

```
shenyu:
  client:
    registerType: etcd
    serverLists: http://localhost:2379
  props:
    contextPath: /http
    appName: http
    port: 8189
    isFull: false
# registerType : register type, set etcd
# serverList: when register type is etcd, add etcd address list
# port: your project port number; apply to springmvc/tars/grpc
# contextPath: your project's route prefix through shenyu gateway, such as /order ,
# /product etc, gateway will route based on it.
# appName: your project name,the default value is`spring.application.name`.
# isFull: set true means providing proxy for your entire service, or only a few
# controller. apply to springmvc/springcloud
```

10.2.4 Consul Registry Config

shenyu-admin config

First add the related dependencies to the pom file :

```
<!-- apache shenyu consul register start-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-register-server-consul</artifactId>
  <version>${project.version}</version>
</dependency>

<!--spring-cloud-starter-consul-discovery need add by yourself, suggest use 2.2.6.
RELEASE version, other version maybe can't work-->
<dependency>
  <groupId>org.springframework.cloud</groupId>
  <artifactId>spring-cloud-starter-consul-discovery</artifactId>
  <version>2.2.6.RELEASE</version>
</dependency>
<!-- apache shenyu consul register end-->
```

- In the yml file to configure the registry as consul, you also need to configure spring.cloud.consul, the configuration information is as follows:

```
shenyu:
  register:
    registerType: consul
    props:
      delay: 1
      wait-time: 55

spring:
  cloud:
    consul:
      discovery:
        instance-id: shenyu-admin-1
        service-name: shenyu-admin
        tags-as-metadata: false
      host: localhost
      port: 8500

# registerType : register type, set consul.
# delay: The interval of each polling of monitoring metadata, in seconds, the
default value is 1 second.
# wait-time: The waiting time for each polling of metadata monitoring, in seconds,
the default value is 55 second.
# instance-id: Required, Consul needs to find specific services through instance-
id.
```

```
# service-name: The name where the service is registered to consul. If not
# configured, the value of `spring.application.name` will be taken by default.
# host: Consul server host, the default value is localhost.
# port: Consul server port, the default value is 8500.
# tags-as-metadata: false, Required, This option must be set to false, otherwise
# the URI information will not be found, will cause to selector and upstream cache
# unable to update.
```

shenyu-client config

Note that the consul registry is currently incompatible with the Spring Cloud service and will conflict with the Eureka/Nacos registry.

The following shows the configuration information registered by Consul when the Http service accesses the Apache ShenYu gateway as a client. Other clients (such as Dubbo and Spring Cloud) can be configured in the same way.

- First add dependencies to the pom file:

```
<dependency>
  <groupId>org.springframework.cloud</groupId>
  <artifactId>spring-cloud-starter-consul-discovery</artifactId>
  <version>2.2.6.RELEASE</version>
</dependency>
```

- Then set the register type to consul in yml and config spring.cloud.consul, and related parameters as follows:

```
shenyu:
  client:
    registerType: consul
    props:
      contextPath: /http
      appName: http
      port: 8188
      isFull: false

spring:
  cloud:
    consul:
      discovery:
        instance-id: shenyu-http-1
        service-name: shenyu-http
        host: localhost
        port: 8500
# registerType : register type, set consul.
# port: your project port number; apply to springmvc/tars/grpc
# contextPath: your project's route prefix through shenyu gateway, such as /order ,
# /product etc, gateway will route based on it.
```

```
# appName: your project name,the default value is`spring.application.name`.
# isFull: set true means providing proxy for your entire service, or only a few
controller. apply to springmvc
# instance-id: Required, Consul needs to find specific services through instance-
id.
# service-name: The name where the service is registered to consul. If not
configured, the value of `spring.application.name` will be taken by default.
# host: Consul server host, the default value is localhost.
# port: Consul server port, the default value is 8500.
```

10.2.5 Nacos Registry Config

shenyu-admin config

First add the related dependencies to the pom file (already added by default) :

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-register-server-nacos</artifactId>
  <version>${project.version}</version>
</dependency>
```

- Then in the yml file, configure the registry as nacos, fill in the related nacos service address and parameters, and nacos namespace (need to be consistent with shenyu-client), the configuration information is as follows:

```
shenyu:
  register:
    registerType: nacos
    serverLists : localhost:8848
  props:
    nacosNameSpace: ShenyuRegisterCenter
```

shenyu-client config

The following shows the configuration information registered by Nacos when the Http service accesses the Apache ShenYu gateway as a client. Other clients (such as Dubbo and Spring Cloud) can be configured in the same way.

- First add dependencies to the pom file:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-register-client-nacos</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

- Then in yml configure registration mode as naco, and fill in nacos service address and related parameters, also need nacos namespace (need to be consistent with shenyu-admin), IP (optional, then automatically obtain the local IP address) and port, configuration information is as follows:

```
shenyu:
  client:
    registerType: nacos
    serverLists: localhost:8848
    props:
      contextPath: /http
      appName: http
      port: 8188
      isFull: false
      nacosNameSpace: ShenyuRegisterCenter
# registerType : register type, set nacos
# serverList: when register type is nacos, add nacos address list
# port: your project port number; apply to springmvc/tars/grpc
# contextPath: your project's route prefix through shenyu gateway, such as /order ,
# /product etc, gateway will route based on it.
# appName: your project name,the default value is`spring.application.name`.
# isFull: set true means providing proxy for your entire service, or only a few
# controller. apply to springmvc/springcloud
# nacosNameSpace: nacos namespace
```

In conclusion, this paper mainly describes how to connect your microservices (currently supporting Http, Dubbo, Spring Cloud, gRPC, Motan, Sofa, Tars and other protocols) to the Apache ShenYu gateway. the Apache ShenYu gateway support registry has Http, Zookeeper, Etcd, Consul, Nacos and so on. This paper introduces the different ways to register configuration information when Http service is used as the client to access Apache ShenYu gateway.

10.3 Http Proxy

This document is intended to help the Http service access the Apache ShenYu gateway. The Apache ShenYu gateway uses the Divide plugin to handle Http requests.

Before the connection, start shenyu-admin correctly, start Divide plugin, and add related dependencies on the gateway and Http application client. Refer to the previous [Quick start with Http](#) .

For details about client access configuration, see [Application Client Access Config](#) .

For details about data synchronization configurations, see [Data Synchronization Config](#) .

10.3.1 Add divide plugin in gateway

- Add the following dependencies to the gateway's pom.xml file:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-divide</artifactId>
  <version>${project.version}</version>
</dependency>

<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-httpclient</artifactId>
  <version>${project.version}</version>
</dependency>
```

10.3.2 Http request access gateway (for springMvc)

Please refer this: [shenyu-examples-http](#)

- SpringBoot

Add the following dependencies to the pom.xml file in your Http service:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-client-springmvc</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

- SpringMvc

Add the following dependencies to the pom.xml file in your Http service:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-client-springmvc</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

Add the following to the XML file defined by your bean :

```
<bean id ="springMvcClientBeanPostProcessor" class ="org.apache.shenyu.client.
springmvc.init.SpringMvcClientBeanPostProcessor">
  <constructor-arg ref="shenyuRegisterCenterConfig"/>
</bean>

<bean id="shenyuRegisterCenterConfig" class="org.apache.shenyu.register.common.
config.ShenyuRegisterCenterConfig">
  <property name="registerType" value="http"/>
```

```

<property name="serverList" value="http://localhost:9095"/>
<property name="props">
    <map>
        <entry key="contextPath" value="/your contextPath"/>
        <entry key="appName" value="your name"/>
        <entry key="port" value="your port"/>
        <entry key="isFull" value="false"/>
    </map>
</property>
</bean>

```

Add this annotation `@ShenyuSpringMvcClient` in your controller interface.

You can apply the annotation to class-level in a controller. The name of the path variable is prefix and `/**` will apply proxy for entire interfaces.

Example(1)

The following indicates that `/test/payment`, `/test/findByUserId` will be proxy by the gateway.

```

@RestController
@RequestMapping("/test")
@ShenyuSpringMvcClient(path = "/test/**")
public class HttpTestController {

    @PostMapping("/payment")
    public UserDTO post(@RequestBody final UserDTO userDTO) {
        return userDTO;
    }

    @GetMapping("/findByUserId")
    public UserDTO findByUserId(@RequestParam("userId") final String userId) {
        UserDTO userDTO = new UserDTO();
        userDTO.setUserId(userId);
        userDTO.setUserName("hello world");
        return userDTO;
    }
}

```

Example(2)

The following indicates that `/order/save` is proxied by the gateway, while `/order/findById` is not.

```

@RestController
@RequestMapping("/order")
@ShenyuSpringMvcClient(path = "/order")
public class OrderController {

    @PostMapping("/save")
    @ShenyuSpringMvcClient(path = "/save")

```

```

public OrderDTO save(@RequestBody final OrderDTO orderDTO) {
    orderDTO.setName("hello world save order");
    return orderDTO;
}

@GetMapping("/findById")
public OrderDTO findById(@RequestParam("id") final String id) {
    OrderDTO orderDTO = new OrderDTO();
    orderDTO.setId(id);
    orderDTO.setName("hello world findById");
    return orderDTO;
}
}

```

- Start your project, your service interface is connected to the gateway, go to the shenyu-admin management system plugin list -> HTTP process -> Divide, see automatically created selectors and rules.

10.3.3 Http request access gateway(other framework)

- First, find divide plugin in shenyu-admin, add selector, and rules, and filter traffic matching.
- If you don't know how to configure, please refer to [Selector Detailed Explanation](#).
- You can also develop your customized http-client, refer to [multi-language Http client development](#).

10.3.4 User request

- Send the request as before, only two points need to notice.
- Firstly, the domain name that requested before in your service, now need to replace with gateway's domain name.
- Secondly, Apache ShenYu Gateway needs a route prefix which comes from contextPath, it configured during the integration with gateway, you can change it freely in divide plugin of shenyu-admin, if you are familiar with it.
 - for example, if you have an order service, and it has an interface, the request url: http://localhost:8080/test/save
 - Now need to change to: http://localhost:9195/order/test/save
 - We can see localhost:9195 is your gateway's ip port, default port number is 9195, /order is your contextPath which you configured with gateway.
 - Other parameters doesn't change in request method.
- Then you can visit, very easy and simple.

10.4 Dubbo Proxy

This document is intended to help the Dubbo service access the Apache ShenYu gateway. The Apache ShenYu gateway uses the Dubbo plugin to handle dubbo service.

Support Alibaba Dubbo(< 2.7.x) and Apache Dubbo (>=2.7.x).

Before the connection, start shenyu-admin correctly, start Dubbo plugin, and add related dependencies on the gateway and Dubbo application client. Refer to the previous [Quick start with Dubbo](#).

For details about client access configuration, see [Application Client Access Config](#).

For details about data synchronization configurations, see [Data Synchronization Config](#).

10.4.1 Add dubbo plugin in gateway

Add these dependencies in gateway's pom.xml.

Alibaba dubbo user, configure the dubbo version and registry center with yours.

```
<!-- apache shenyu alibaba dubbo plugin start-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-alibaba-dubbo</artifactId>
  <version>${project.version}</version>
</dependency>
<!-- apache shenyu alibaba dubbo plugin end-->
<dependency>
  <groupId>com.alibaba</groupId>
  <artifactId>dubbo</artifactId>
  <version>2.6.5</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-client</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-framework</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-recipes</artifactId>
  <version>4.0.1</version>
</dependency>
```

Apache dubbo user, configure the dubbo version and registry center with yours.

```

<!-- apache shenyu apache dubbo plugin start-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-apache-dubbo</artifactId>
  <version>${project.version}</version>
</dependency>
<!-- apache shenyu apache dubbo plugin end-->

<dependency>
  <groupId>org.apache.dubbo</groupId>
  <artifactId>dubbo</artifactId>
  <version>2.7.5</version>
</dependency>
<!-- Dubbo Nacos registry dependency start -->
<dependency>
  <groupId>org.apache.dubbo</groupId>
  <artifactId>dubbo-registry-nacos</artifactId>
  <version>2.7.5</version>
</dependency>
<dependency>
  <groupId>com.alibaba.nacos</groupId>
  <artifactId>nacos-client</artifactId>
  <version>1.1.4</version>
</dependency>
<!-- Dubbo Nacos registry dependency end-->

<!-- Dubbo zookeeper registry dependency start-->
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-client</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-framework</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-recipes</artifactId>
  <version>4.0.1</version>
</dependency>
<!-- Dubbo zookeeper registry dependency end -->

```

- restart gateway service.

10.4.2 Dubbo service access gateway

Dubbo integration with gateway, please refer to : [shenyu-examples-dubbo](#) .

- Alibaba Dubbo User

- SpringBoot

Add these dependencies:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-client-alibaba-dubbo</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

- Spring

Add these dependencies:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-client-alibaba-dubbo</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

Inject these properties into your Spring beans XML file:

```
<bean id="alibabaDubboServiceBeanPostProcessor" class="org.apache.shenyu.
client.alibaba.dubbo.AlibabaDubboServiceBeanPostProcessor">
  <constructor-arg ref="shenyuRegisterCenterConfig"/>
</bean>

<bean id="shenyuRegisterCenterConfig" class="org.apache.shenyu.register.
common.config.ShenyuRegisterCenterConfig">
  <property name="registerType" value="http"/>
  <property name="serverList" value="http://localhost:9095"/>
  <property name="props">
    <map>
      <entry key="contextPath" value="/your contextPath"/>
      <entry key="appName" value="your name"/>
      <entry key="isFull" value="false"/>
    </map>
  </property>
</bean>
```

- Apache Dubbo User

- SpringBoot

Add these dependencies:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-client-apache-dubbo</
artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

– Spring

Add these dependencies:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-client-apache-dubbo</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

Inject these properties into your Spring beans XML file:

```
<bean id ="apacheDubboServiceBeanPostProcessor" class ="org.apache.shenyu.
client.apache.dubbo.apacheDubboServiceBeanPostProcessor">
  <constructor-arg ref="shenyuRegisterCenterConfig"/>
</bean>

<bean id="shenyuRegisterCenterConfig" class="org.apache.shenyu.register.
common.config.ShenyuRegisterCenterConfig">
  <property name="registerType" value="http"/>
  <property name="serverList" value="http://localhost:9095"/>
  <property name="props">
    <map>
      <entry key="contextPath" value="/your contextPath"/>
      <entry key="appName" value="your name"/>
      <entry key="isFull" value="false"/>
    </map>
  </property>
</bean>
```

10.4.3 Dubbo configuration

- Enable dubbo option in shenyu-admin.
- Configure your registry address in dubbo.

```
{"register":"zookeeper://localhost:2181"} or {"register":"nacos://localhost:8848"
"}
```

Configure the interface with gateway

- you can add the annotation `@ShenyuDubboClient` to your dubbo service implementation class, so that the interface method will be configured with gateway.
- Start your provider. After successful startup, go to PluginList -> rpc Proxy -> dubbo in the backend management system. You will see auto-registered selectors and rules information.

Dubbo user request and parameter explanation.

- Communicate with dubbo service through Http transport protocol.
- Apache ShenYu gateway need a route prefix which configured when accessing the project.

```
# for example: you have an order service and it has a interface, registry address:
/order/test/save

# now we can communicate with gateway through POST request http://localhost:9195/
order/test/save

# localhost:9195 is gateway's ip port, default port is 9195 , /order is the
contextPath you set through gateway.
```

- parameter deliver:
 - communicate with gateway through body or json of http post request.
 - more parameter types, please refer to the interface definition in [shenyu-examples-dubbo](#) and parameter passing method.
- Single java bean parameter type (default).
- Multi-parameter type support, add this config value in gateway' s yaml file:

```
shenyu:
  dubbo:
    parameter: multi
```

- Support for customized multi-parameter type
- Create a new implementation class `MyDubboParamResolveService` in your gateway project of `org.apache.shenyu.web.dubbo.DubboParamResolveService`.

```
public interface DubboParamResolveService {

    /**
     * Build parameter pair.
     * this is Resolve http body to get dubbo param.
     *
     * @param body          the body
     * @param parameterTypes the parameter types
     * @return the pair
     */
}
```



```

    */
    Pair<String[], Object[]> buildParameter(String body, String parameterTypes);
}

```

- body is the json string in http request.
- parameterTypes: the list of method parameter types that are matched, split with ,.
- in Pair, left is parameter type, right is parameter value, it's the standard of dubbo generalization calls.
- Inject your class into Spring bean, cover the default implementation.

```

@Bean
public DubboParamResolveService myDubboParamResolveService() {
    return new MyDubboParamResolveService();
}

```

10.4.4 Service governance

- Tag route
 - Add Dubbo_Tag_Route when send request, the current request will be routed to the provider of the specified tag, which is only valid for the current request.
- Explicit Target
 - Set the url property in the annotation @ShenyuDubboClient.
 - Update the configuration in Admin.
 - It's valid for all request.
- Param valid and ShenYuException
 - Set validation="shenyuValidation".
 - When ShenYuException is thrown in the interface, exception information will be returned. It should be noted that ShenYuException is thrown explicitly.

```

@Service(validation = "shenyuValidation")
public class TestServiceImpl implements TestService {

    @Override
    @ShenyuDubboClient(path = "/test", desc = "test method")
    public String test(@Valid HelloServiceRequest name) throws
    ShenYuException {
        if (true){
            throw new ShenYuException("Param binding error.");
        }
        return "Hello " + name.getName();
    }
}

```

```

    }
}

```

– Request param

```

public class HelloServiceRequest implements Serializable {

    private static final long serialVersionUID = -5968745817846710197L;

    @NotEmpty(message = "name cannot be empty")
    private String name;

    @NotNull(message = "age cannot be null")
    private Integer age;

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public Integer getAge() {
        return age;
    }

    public void setAge(Integer age) {
        this.age = age;
    }
}

```

– Send request

```

{
    "name": ""
}

```

– Response

```

{
    "code": 500,
    "message": "Internal Server Error",
    "data": "name cannot be empty,age cannot be null"
}

```

– Error message

```
{
  "code": 500,
  "message": "Internal Server Error",
  "data": "Param binding error."
}
```

10.4.5 Http → Gateway → Dubbo Provider

It basically switches from HTTP request to Dubbo protocol, then invoke Dubbo service and return to the result. Two things need to notice after integration with gateway, one is the added annotation `@ShenyuDubboClient`, another is a path used to specify the request path. And you added a config value of `contextPath`.

If you have a function like this, the config value in `contextPath` is `/dubbo`

```
@Override
@ShenyuDubboClient(path = "/insert", desc = "insert data")
public DubboTest insert(final DubboTest dubboTest) {
    return dubboTest;
}
```

So our request path is: <http://localhost:9195/dubbo/insert>, `localhost:9195` is the gateway's domain name, if you changed before, so does with yours here..

`DubboTest` is a java bean object, has 2 parameters, `id` and `name`, so we can transfer the value's json type through request body.

```
{"id": "1234", "name": "XIAO5y"}
```

If your interface has no parameter, then the value is:

```
{}
```

If the interface has multiple parameters, refer to the multi-parameter type support described above.

10.5 Spring Cloud Proxy

This document is intended to help the Spring Cloud service access the Apache ShenYu gateway. The Apache ShenYu gateway uses the `springCloud` plugin to handle Spring Cloud service.

Before the connection, start `shenyu-admin` correctly, start `springCloud` plugin, and add related dependencies on the gateway and `springCloud` application client. Refer to the previous [Quick start with Spring Cloud](#).

For details about client access configuration, see [Application Client Access Config](#).

For details about data synchronization configurations, see [Data Synchronization Config](#).

10.5.1 Add springcloud plugin in gateway

- add these dependencies in gateway' s pom.xml:

```
<!-- apache shenyu springCloud plugin start-->
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-springcloud</artifactId>
  <version>${project.version}</version>
</dependency>

<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-httpclient</artifactId>
  <version>${project.version}</version>
</dependency>
<!-- apache shenyu springCloud plugin end-->

<dependency>
  <groupId>org.springframework.cloud</groupId>
  <artifactId>spring-cloud-commons</artifactId>
  <version>2.2.0.RELEASE</version>
</dependency>
<dependency>
  <groupId>org.springframework.cloud</groupId>
  <artifactId>spring-cloud-starter-netflix-ribbon</artifactId>
  <version>2.2.0.RELEASE</version>
</dependency>
```

- If you use eureka as SpringCloud registry center.

add these dependencies:

```
<dependency>
  <groupId>org.springframework.cloud</groupId>
  <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
  <version>2.2.0.RELEASE</version>
</dependency>
```

add these config values in gateway' s yaml file:

```
eureka:
  client:
    serviceUrl:
      defaultZone: http://localhost:8761/eureka/ #your eureka address
  instance:
    prefer-ip-address: true
```

- if you use nacos as Spring Cloud registry center.

add these dependencies:

```
<dependency>
  <groupId>com.alibaba.cloud</groupId>
  <artifactId>spring-cloud-starter-alibaba-nacos-discovery</artifactId>
  <version>2.1.0.RELEASE</version>
</dependency>
```

add these config values in gateway' s yaml file:

```
spring:
  cloud:
    nacos:
      discovery:
        server-addr: 127.0.0.1:8848 # your nacos address
```

- restart your gateway service.

10.5.2 SpringCloud service access gateway

Please refer to [shenyu-examples-springcloud](#)

- Add the following dependencies to your Spring Cloud microservice :

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-client-springcloud</artifactId>
  <version>${shenyu.version}</version>
</dependency>
```

- Add the annotation `@ShenyuSpringCloudClient` in your controller interface. you can apply the annotation to class-level in a controller.the name of the path variable is prefix and ' `/**` ' will apply proxy for entire interfaces.
- example (1): both `/test/payment` and `/test/findByUserId` will be handled by gateway.

```
@RestController
@RequestMapping("/test")
@ShenyuSpringCloudClient(path = "/test/**")
public class HttpTestController {

    @PostMapping("/payment")
    public UserDTO post(@RequestBody final UserDTO userDTO) {
        return userDTO;
    }

    @GetMapping("/findByUserId")
    public UserDTO findByUserId(@RequestParam("userId") final String userId) {
        UserDTO userDTO = new UserDTO();
        userDTO.setUserId(userId);
    }
}
```

```

        userDTO.setUserName("hello world");
        return userDTO;
    }
}

```

example (2): `/order/save` will be handled by gateway, and `/order/findById` won't.

```

@RestController
@RequestMapping("/order")
@ShenyuSpringCloudClient(path = "/order")
public class OrderController {

    @PostMapping("/save")
    @ShenyuSpringMvcClient(path = "/save")
    public OrderDTO save(@RequestBody final OrderDTO orderDTO) {
        orderDTO.setName("hello world save order");
        return orderDTO;
    }

    @GetMapping("/findById")
    public OrderDTO findById(@RequestParam("id") final String id) {
        OrderDTO orderDTO = new OrderDTO();
        orderDTO.setId(id);
        orderDTO.setName("hello world findById");
        return orderDTO;
    }
}

```

example (3): `isFull: true` represents that all service will be represented by the gateway.

```

shenyu:
  client:
    registerType: http
    serverLists: http://localhost:9095
    props:
      contextPath: /http
      appName: http
      isFull: true
# registerType : service registre type, see the application client access document
# serverList: server list, see the application client access document
# contextPath: route prefix for your project in ShenYu gateway.
# appName: your application name
# isFull: set true to proxy your all service and false to proxy some of your
controllers

```

```

@RestController
@RequestMapping("/order")
public class OrderController {

```

```

@PostMapping("/save")
@ShenyuSpringMvcClient(path = "/save")
public OrderDTO save(@RequestBody final OrderDTO orderDTO) {
    orderDTO.setName("hello world save order");
    return orderDTO;
}

@GetMapping("/findById")
public OrderDTO findById(@RequestParam("id") final String id) {
    OrderDTO orderDTO = new OrderDTO();
    orderDTO.setId(id);
    orderDTO.setName("hello world findById");
    return orderDTO;
}
}

```

- After successfully registering your service, go to the backend management system PluginList -> rpc proxy -> springCloud', you will see the automatic registration of selectors and rules information.

10.5.3 User Request

- Send the request as before, only two points need to notice.
- firstly, the domain name that requested before in your service, now need to replace with gateway's domain name.
- secondly, Apache ShenYu gateway needs a route prefix which comes from contextPath, it configured during the integration with gateway, you can change it freely in divide plugin of shenyu-admin, if your familiar with it.

For example, you have an order service and it has a interface, the request url: `http://localhost:8080/test/save`.

Now need to change to: `http://localhost:9195/order/test/save`.

We can see `localhost:9195` is the gateway's ip port, default port number is 9195, /order is the contextPath in your config yaml file.

The request of other parameters doesn't change. Then you can visit, very easy and simple.

10.6 Sofa Proxy

This document is intended to help the Sofa service access the Apache ShenYu gateway. The Apache ShenYu gateway uses the Sofa plugin to handle sofa service.

Before the connection, start shenyu-admin correctly, start Sofa plugin, and add related dependencies on the gateway and Sofa application client. Refer to the previous [Quick start with Sofa](#).

For details about client access configuration, see [Application Client Access Config](#).

For details about data synchronization configurations, see [Data Synchronization Config](#).

10.6.1 Add sofa plugin in gateway

- Add the following dependencies in the gateway's pom.xml file:
- Replace the sofa version with yours, and replace the jar package in the registry with yours, The following is a reference.

```
<dependency>
  <groupId>com.alipay.sofa</groupId>
  <artifactId>sofa-rpc-all</artifactId>
  <version>5.7.6</version>
  <exclusions>
    <exclusion>
      <groupId>net.jcip</groupId>
      <artifactId>jcip-annotations</artifactId>
    </exclusion>
  </exclusions>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-client</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-framework</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.curator</groupId>
  <artifactId>curator-recipes</artifactId>
  <version>4.0.1</version>
</dependency>
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-plugin-sofa</artifactId>
```



```
<version>${project.version}</version>
</dependency>
```

- Restart the gateway service.

10.6.2 Sofa service access gateway

you can refer to: [shenyu-examples-sofa](#)

- SpringBoot

Add the following dependencies : xml `<dependency> <groupId>org.apache.shenyu</groupId> <artifactId>shenyu-spring-boot-starter-client-sofa</artifactId> <version>${shenyu.version}</version> </dependency>`

- Spring

Add the following dependencies: xml `<dependency> <groupId>org.apache.shenyu</groupId> <artifactId>shenyu-client-sofa</artifactId> <version>${shenyu.version}</version> </dependency>` Add the following in the xml file of your bean definition:

```
<bean id="sofaServiceBeanPostProcessor" class="org.apache.shenyu.client.
sofa.SofaServiceBeanPostProcessor">
    <constructor-arg ref="shenyuRegisterCenterConfig"/>
</bean>

<bean id="shenyuRegisterCenterConfig" class="org.apache.shenyu.register.
common.config.ShenyuRegisterCenterConfig">
    <property name="registerType" value="http"/>
    <property name="serverList" value="http://localhost:9095"/>
    <property name="props">
        <map>
            <entry key="contextPath" value="/your contextPath"/>
            <entry key="appName" value="your name"/>
            <entry key="isFull" value="false"/>
        </map>
    </property>
</bean>
```

10.6.3 Plugin Settings

- First in the shenyu-admin plugin management, set the sofa plugin to open.
- Secondly, configure your registered address in the sofa plugin, or the address of other registry.

```
{"protocol":"zookeeper","register":"127.0.0.1:2181"}
```

10.6.4 Interface registered to the gateway

- For your sofa service implementation class, add `@ShenYuSofaClient` annotation to the method, Indicates that the interface method is registered to the gateway.
- Start the sofa service provider, after successful registration, enter the pluginList -> rpc proxy -> sofa in the background management system, you will see the automatic registration of selectors and rules information.

10.6.5 User request and parameter description

ShenYu gateway needs to have a routing prefix, this routing prefix is for you to access the project for configuration contextPath .

For example, if you have an order service, it has an interface and its registration path / order/test/save

Now it's to request the gateway via post: `http://localhost:9195/order/test/save`

Where `localhost:9195` is the IP port of the gateway, default port is 9195, /order is the contextPath of your sofa access gateway configuration

- Parameter passing:
 - Access the gateway through http post, and pass through body and json.
 - For more parameter type transfer, please refer to the interface definition in [shenyu-examples-sofa](#) and the parameter transfer method.
- Single java bean parameter type (default)
- Customize multi-parameter support:
- In the gateway project you built, add a new class `MySofaParamResolveService`, implements `org.apache.shenyu.plugin.api.sofa.SofaParamResolveService`.

```
public interface SofaParamResolveService {

    /**
     * Build parameter pair.
     * this is Resolve http body to get sofa param.
     *
     * @param body          the body
     */
}
```

```

    * @param parameterTypes the parameter types
    * @return the pair
    */
    Pair<String[], Object[]> buildParameter(String body, String parameterTypes);
}

```

- body is the json string passed by body in http.
- parameterTypes: list of matched method parameter types, If there are multiple, use , to separate.
- In Pair, left is the parameter type, and right is the parameter value. This is the standard for sofa generalization calls.
- Register your class as a String bean and override the default implementation.

```

@Bean
public SofaParamResolveService mySofaParamResolveService() {
    return new MySofaParamResolveService();
}

```

10.7 gRPC Proxy

This document is intended to help the gRPC service access the Apache ShenYu gateway. The Apache ShenYu gateway uses the gRPC plugin to handle gRPC service.

Before the connection, start shenyu-admin correctly, start gRPC plugin, and add related dependencies on the gateway and gRPC application client. Refer to the previous [Quick start with gRPC](#).

For details about client access configuration, see [Application Client Access Config](#).

For details about data synchronization configurations, see [Data Synchronization Config](#).

10.7.1 Add gRPC plugin in gateway

Add the following dependencies in the gateway's pom.xml file:

```

<!-- apache shenyu grpc plugin start-->
<dependency>
    <groupId>org.apache.shenyu</groupId>
    <artifactId>shenyu-spring-boot-starter-plugin-grpc</artifactId>
    <version>${project.version}</version>
</dependency>
<!-- apache shenyu grpc plugin end-->

```

- Restart the gateway service.

10.7.2 gRPC service access gateway

You can refer to: [shenyu-examples-grpc](#) .

- In the microservice built by gRPC, add the following dependencies:

```
<dependency>
  <groupId>org.apache.shenyu</groupId>
  <artifactId>shenyu-spring-boot-starter-client-grpc</artifactId>
  <version>${shenyu.version}</version>
  <exclusions>
    <exclusion>
      <artifactId>guava</artifactId>
      <groupId>com.google.guava</groupId>
    </exclusion>
  </exclusions>
</dependency>
```

Execute command to generate java code in shenyu-examples-grpc project.

```
mvn protobuf:compile
mvn protobuf:compile-custom
```

Add @ShenyuGrpcClient Annotation on the gRPC service interface implementation class. Start your service provider, after successful registration, in the background management system go to PluginList -> rpc proxy -> gRPC, you will see automatic registration of selectors and rules information.

Example:

```
@Override
@ShenyuGrpcClient(path = "/echo", desc = "echo")
public void echo(EchoRequest request, StreamObserver<EchoResponse>
responseObserver) {
    System.out.println("Received: " + request.getMessage());
    EchoResponse.Builder response = EchoResponse.newBuilder()
        .setMessage("ReceivedHELLO")
        .addTraces(Trace.newBuilder().setHost(getHostname()).build());
    responseObserver.onNext(response.build());
    responseObserver.onCompleted();
}
```

10.7.3 User Request

You can request your gRPC service by Http. The Apache ShenYu gateway needs to have a route prefix that you access to configure contextPath.

If your proto file is defined as follows:

```
message EchoRequest {
  string message = 1;
}
```

So the request parameters look like this:

```
{
  "data": [
    {
      "message": "hello grpc"
    }
  ]
}
```

The parameters are currently passed in json format, and the name of key defaults to data, which you can reset in GrpcConstants.JSON_DESCRIPTOR_PROTO_FIELD_NAME; The value is passed in according to the proto file you define.

the Apache ShenYu can support streaming calls to gRPC service, passing multiple arguments in the form of an array.

If your proto file is defined as follows:

```
message RequestData {
  string text = 1;
}
```

The corresponding method call request parameters are as follows:

- UNARY

```
{
  "data": [
    {
      "text": "hello grpc"
    }
  ]
}
```

- CLIENT_STREAMING

```
{
  "data": [
    {
```

```

        "text": "hello grpc"
    },
    {
        "text": "hello grpc"
    },
    {
        "text": "hello grpc"
    }
]
}

```

- SERVER_STREAMING

```

{
  "data": [
    {
      "text": "hello grpc"
    }
  ]
}

```

- BIDI_STREAMING

```

{
  "data": [
    {
      "text": "hello grpc"
    },
    {
      "text": "hello grpc"
    },
    {
      "text": "hello grpc"
    }
  ]
}

```

10.8 Tars Proxy

This document is intended to help the Tars service access the Apache ShenYu gateway. The Apache ShenYu gateway uses the tars plugin to handle tars service.

Before the connection, start shenyu-admin correctly, start tars plugin, and add related dependencies on the gateway and tars application client. Refer to the previous [Quick start with Tars](#).

For details about client access configuration, see [Application Client Access Config](#).

For details about data synchronization configurations, see [Data Synchronization Config](#).

10.8.1 Add tars plugin in gateway

Add the following dependencies to the gateway's pom.xml file:

```
<!-- apache shenyu tars plugin start-->
<dependency>
    <groupId>org.apache.shenyu</groupId>
    <artifactId>shenyu-spring-boot-starter-plugin-tars</artifactId>
    <version>${project.version}</version>
</dependency>

<dependency>
    <groupId>com.tencent.tars</groupId>
    <artifactId>tars-client</artifactId>
    <version>1.7.2</version>
</dependency>
<!-- apache shenyu tars plugin end-->
```

- Restart your gateway service.

10.8.2 Tars service access gateway

Please refer to: [shenyu-examples-tars](#)

- In the microservice built by Tars, add the following dependencies:

```
<dependency>
    <groupId>org.apache.shenyu</groupId>
    <artifactId>shenyu-spring-boot-starter-client-tars</artifactId>
    <version>${shenyu.version}</version>
</dependency>
```

Add @ShenyuTarsService Annotation on the tars service interface implementation class and @ShenyuTarsClient on the method, start your service provider, and register successfully. In the background management system, enter PluginList -> rpc proxy -> tars, you will see the automatic registration of selectors and rules information.

Example:

```
@TarsServant("HelloObj")
@ShenyuTarsService(serviceName = "ShenyuExampleServer.ShenyuExampleApp.HelloObj")
public class HelloServantImpl implements HelloServant {
    @Override
    @ShenyuTarsClient(path = "/hello", desc = "hello")
    public String hello(int no, String name) {
        return String.format("hello no=%s, name=%s, time=%s", no, name, System.
currentTimeMillis());
    }
}
```

```

@Override
@ShenyuTarsClient(path = "/helloInt", desc = "helloInt")
public int helloInt(int no, String name) {
    return 1;
}
}

```

10.8.3 User Request

You can request your tars service by Http. The Apache ShenYu gateway needs to have a route prefix which is the contextPath configured by the access gateway. For example: `http://localhost:9195/tars/hello`.

10.9 Motan Proxy

This document is intended to help the Motan service access the Apache ShenYu gateway. The Apache ShenYu gateway uses the Motan plugin to handle motan service.

Before the connection, start `shenyu-admin` correctly, start Motan plugin, and add related dependencies on the gateway and Motan application client. Refer to the previous [Quick start with Motan](#).

For details about client access configuration, see [Application Client Access Config](#).

For details about data synchronization configurations, see [Data Synchronization Config](#).

10.9.1 Add motan plugin in gateway

Add the following dependencies to the gateway's `pom.xml` file:

```

<!-- apache shenyu motan plugin -->
<dependency>
    <groupId>org.apache.shenyu</groupId>
    <artifactId>shenyu-spring-boot-starter-plugin-motan</artifactId>
    <version>${project.version}</version>
</dependency>

<dependency>
    <groupId>com.weibo</groupId>
    <artifactId>motan-core</artifactId>
    <version>1.1.9</version>
</dependency>

<dependency>
    <groupId>com.weibo</groupId>
    <artifactId>motan-registry-zookeeper</artifactId>
    <version>1.1.9</version>

```



```

</dependency>

<dependency>
    <groupId>com.weibo</groupId>
    <artifactId>motan-transport-netty4</artifactId>
    <version>1.1.9</version>
</dependency>

<dependency>
    <groupId>com.weibo</groupId>
    <artifactId>motan-springsupport</artifactId>
    <version>1.1.9</version>
</dependency>

```

- Restart your gateway service.

10.9.2 Motan service access gateway

Please refer to: [shenyu-examples-motan](#)

- In the microservice built by Motan, add the following dependencies:

```

<dependency>
    <groupId>org.apache.shenyu</groupId>
    <artifactId>shenyu-spring-boot-starter-client-motan</artifactId>
    <version>${shenyu.version}</version>
</dependency>

```

Add @ShenyuMotanClient annotation to the method of Motan service interface implementation class, start your service provider, after successful registration, go to PluginList -> rpc proxy -> motan in the background management system, you will see automatic registration of selectors and rules information.

Example:

```

@MotanService(export = "demoMotan:8002")
public class MotanDemoServiceImpl implements MotanDemoService {
    @Override
    @ShenyuMotanClient(path = "/hello")
    public String hello(String name) {
        return "hello " + name;
    }
}

```

10.9.3 User Request

You can request your motan service by Http. The Apache ShenYu gateway needs to have a route prefix which is the contextPath configured by the access gateway. For example: `http://localhost:9195/motan/hello`.

11.1 2.3.0

11.1.1 soul-admin

- Add open field to allow app path authentication or not in sign plugin.
- Optimize divide plugin to use common plugin template in soul-dashboard.
- Add default values and rule checks in plugin handler.
- Add resource management to allow user to add plugin, adjust menu and button resource and so on in soul-dashboard and soul-admin.
- Add menu and data permission in soul-admin.
- Add H2 stroe for soul-admin

11.1.2 soul-bootstrap

- Add tars plugin
- Add sentinel plugin –Add sofa plugin
- Add Resilience4j plugin for soul-plugin.
- Add Context path mapping plugin for soul-plugin.
- Add Grpc plugin supports grpc protocol.
- Support form submission for dubbo plugin.
- feat(plugin handle):
- Add dist package module
- Add test cases for soul-admin
- Add register center for consul
- Add register center for etcd

- Add register center for nacos
- Add register center for zookeeper

11.2 2.2.0

- Complete plug-in architecture design, plug-in hot-swappable.
- Fully supports all versions of dubbo, alibaba-dubbo, apache-dubbo.
- Support dubbo generalization call, multi-parameter, complex parameter interface.
- Enhance the monitoring plug-in, remove influxdb support, increase memory, CPU, QPS, TPS, response delay and other indicators, and support access to Prometheus.
- The springCloud plug-in supports two registration centers, eureka and nacos.
- Waf plug-in enhancements, black and white albums, and mixed modes.
- Removed the Hystrix fuse function, independent as a plug-in support.
- Modify the data synchronization method bug in Zookeeper, and add the nacos synchronization method.
- Diversified customer support, providing traditional and springboot access to spring.
- Optimize the soul-background control interface.
- Load balancing algorithm bug repair.
- Fix bugs when uploading large files.

12.1 Latest Releases

Apache ShenYu (`incubating`) is released as source code tarballs with corresponding binary tarballs for convenience.

The downloads are distributed via mirror sites and should be checked for tampering using GPG or SHA-512.

12.1.1 Apache ShenYu (`incubating`) – Version: 2.4.0 (Release Date: Aug 8, 2021)

- Source Codes [\[zip\]](#) [\[asc\]](#) [\[sha512\]](#)
- ShenYu-Admin Binary Distribution [\[tar\]](#) [\[asc\]](#) [\[sha512\]](#)
- ShenYu-Bootstrap Binary Distribution [\[tar\]](#) [\[asc\]](#) [\[sha512\]](#)

12.2 Verify the Releases

PGP signatures KEYS

It is essential that you verify the integrity of the downloaded files using the PGP or SHA signatures. The PGP signatures can be verified using GPG or PGP. Please download the KEYS as well as the asc signature files for relevant distribution. It is recommended to get these files from the main distribution directory and not from the mirrors.

```
gpg -i KEYS
```

or

```
pgpk -a KEYS
```

or

```
pgp -ka KEYS
```

To verify the binaries/sources you can download the relevant asc files for it from main distribution directory and follow the below guide.

```
gpg --verify apache-shenyu-*****.asc apache-shenyu-*****
```

or

```
pgpv apache-shenyu-*****.asc
```

or

```
pgp apache-shenyu-*****.asc
```

12.3 PDF

Apache ShenYu (incubating) provides a packaged and downloaded PDF of the docs for users and developers to use.

- [English](#)