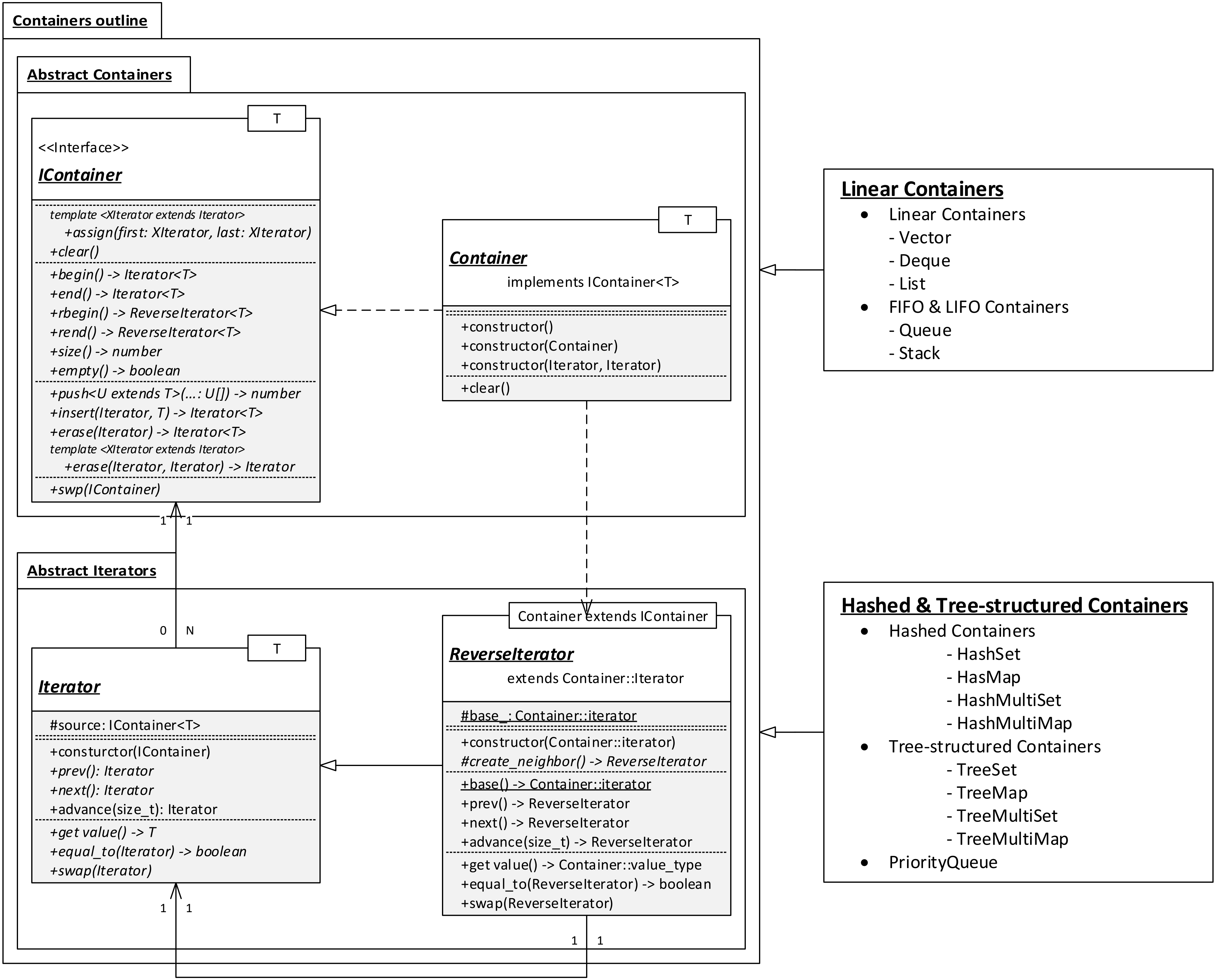
TS Class Diagram

1. TypeScript-STL
2. Collection
3. Library
4. **Protocol**
5. **Templates**
6. Examples

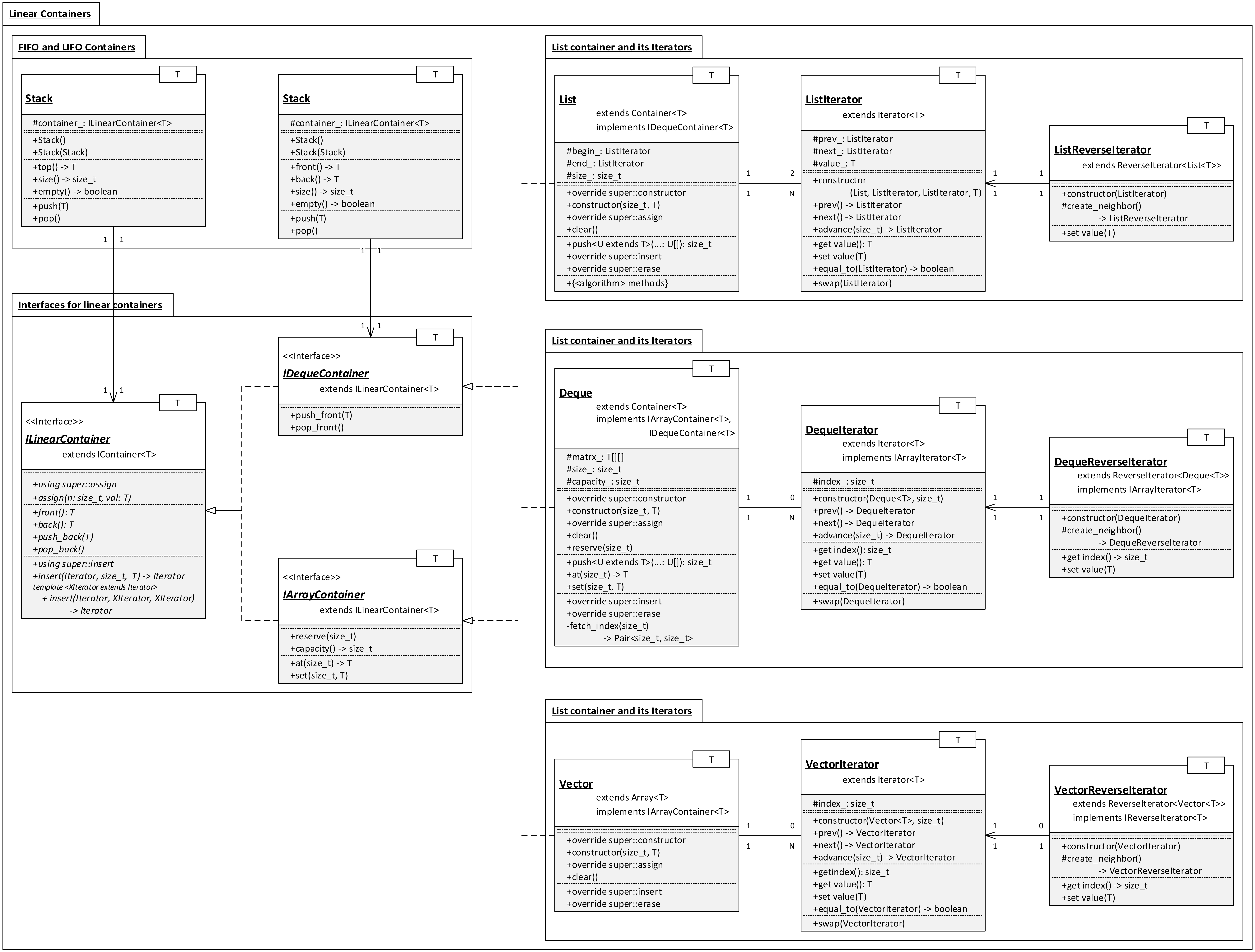
TypeScript-STL

TypeScript-STL (Standard Template Library)

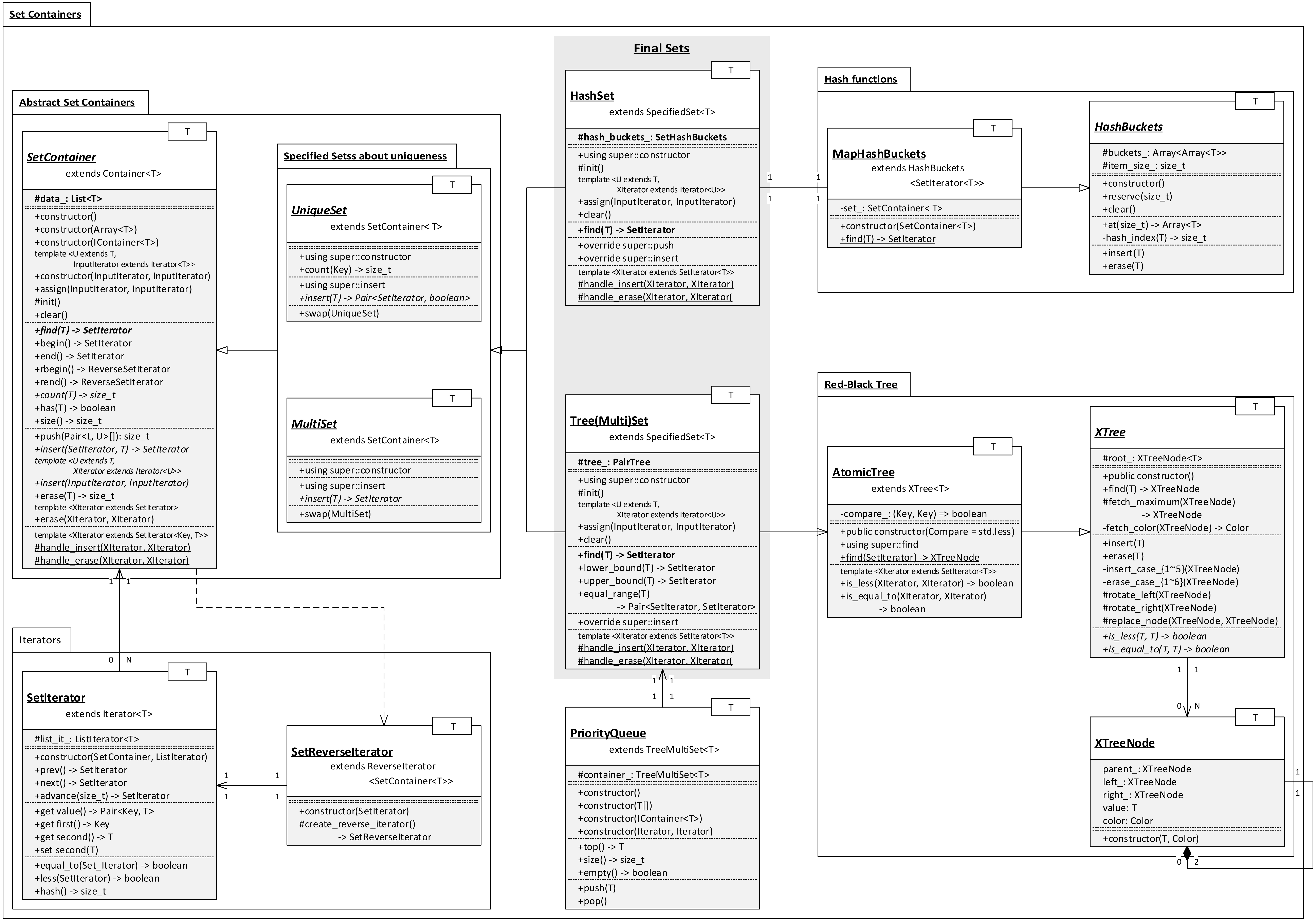
Basics
Linear Containers
Set Containers
Map Containers

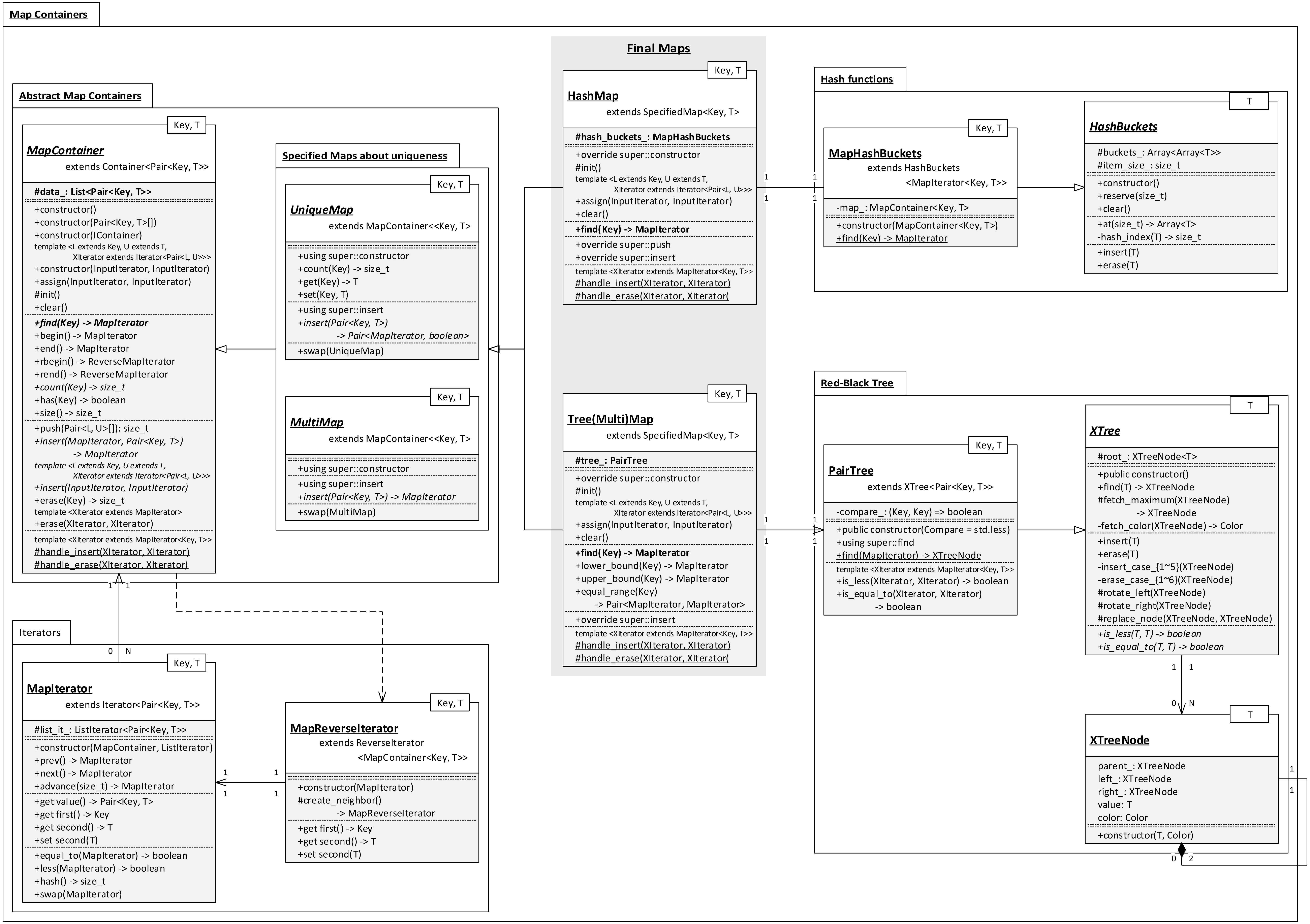


Containers outline
Abstract Containers
T
<<Interface>>
IContainer
template <XIterator extends Iterator>
+assign(first: XIterator, last: XIterator)
+clear()
+begin() -> Iterator<T>
+end() -> Iterator<T>
+rbegin() -> ReverseIterator<T>
+rend() -> ReverseIterator<T>
+size() -> number
+empty() -> boolean
+push<U extends T>(...: U[]) -> number
+insert(Iterator, T) -> Iterator<T>
+erase(Iterator) -> Iterator<T>
template <XIterator extends Iterator>
+erase(Iterator, Iterator) -> Iterator
+swp(IContainer)
T
Container
implements IContainer<T>
+constructor()
+constructor(Container)
+constructor(Iterator, Iterator)
+clear()
1
1
Abstract Iterators
0
N
T
Iterator
#source: IContainer<T>
+consturctor(IContainer)
+prev(): Iterator
+next(): Iterator
+advance(size_t): Iterator
+get value() -> T
+equal_to(Iterator) -> boolean
+swap(Iterator)
1
1
Container extends IContainer
ReverseIterator
extends Container::Iterator
#base_: Container::iterator
+constructor(Container::iterator)
#create_neighbor() -> ReverseIterator
+base() -> Container::iterator
+prev() -> ReverseIterator
+next() -> ReverseIterator
+advance(size_t) -> ReverseIterator
+get value() -> Container::value_type
+equal_to(ReverseIterator) -> boolean
+swap(ReverseIterator)
1
1
Linear Containers
Linear Containers
- Vector
- Deque
- List
FIFO & LIFO Containers
- Queue
- Stack
Hashed & Tree-structured Containers
Hashed Containers
- HashSet
- HasMap
- HashMultiSet
- HashMultiMap
Tree-structured Containers
- TreeSet
- TreeMap
- TreeMultiSet
- TreeMultiMap
PriorityQueue



Linear Containers
FIFO and LIFO Containers
T
Stack
#container_: ILinearContainer<T>
+Stack()
+Stack(Stack)
+top() -> T
+size() -> size_t
+empty() -> boolean
+push(T)
+pop()
T
Stack
#container_: ILinearContainer<T>
+Stack()
+Stack(Stack)
+front() -> T
+back() -> T
+size() -> size_t
+empty() -> boolean
+push(T)
+pop()
1 1
1 1
Interfaces for linear containers
1 1
1 1
T
<<Interface>>
IDequeContainer
extends ILinearContainer<T>
+push_front(T)
+pop_front()
T
<<Interface>>
ILinearContainer
extends IContainer<T>
+using super::assign
+assign(n: size_t, val: T)
+front(): T
+back(): T
+push_back(T)
+pop_back()
+using super::insert
+insert(Iterator, size_t, T) -> Iterator
template <XIterator extends Iterator>
+ insert(Iterator, XIterator, XIterator)
-> Iterator
T
<<Interface>>
IArrayContainer
extends ILinearContainer<T>
+reserve(size_t)
+capacity() -> size_t
+at(size_t) -> T
+set(size_t, T)
List container and its Iterators
T
List
extends Container<T>
implements IDequeContainer<T>
#begin_: ListIterator
#end_: ListIterator
#size_: size_t
+override super::constructor
+constructor(size_t, T)
+override super::assign
+clear()
+push<U extends T>(...: U[]): size_t
+override super::insert
+override super::erase
+{<algorithm> methods}
1 2
1 N
T
ListIterator
extends Iterator<T>
#prev_: ListIterator
#next_: ListIterator
#value_: T
+constructor
(List, ListIterator, ListIterator, T)
+prev() -> ListIterator
+next() -> ListIterator
+advance(size_t) -> ListIterator
+get value(): T
+set value(T)
+equal_to(ListIterator) -> boolean
+swap(ListIterator)
1 1
1 1
T
ListReverseIterator
extends ReverseIterator<List<T>>
+constructor(ListIterator)
#create_neighbor()
-> ListReverseIterator
+set value(T)
List container and its Iterators
T
Deque
extends Container<T>
implements IArrayContainer<T>,
IDequeContainer<T>
#matrx_: T[][]
#size_: size_t
#capacity_: size_t
+override super::constructor
+constructor(size_t, T)
+override super::assign
+clear()
+reserve(size_t)
+push<U extends T>(...: U[]): size_t
+at(size_t) -> T
+set(size_t, T)
+override super::insert
+override super::erase
-fetch_index(size_t)
-> Pair<size_t, size_t>
1 0
1 N
T
DequeIterator
extends Iterator<T>
implements IArrayIterator<T>
#index_: size_t
+constructor(Deque<T>, size_t)
+prev() -> DequeIterator
+next() -> DequeIterator
+advance(size_t) -> DequeIterator
+get index(): size_t
+get value(): T
+set value(T)
+equal_to(DequeIterator) -> boolean
+swap(DequeIterator)
1 1
1 1
T
DequeReverseIterator
extends ReverseIterator<Deque<T>>
implements IArrayIterator<T>
+constructor(DequeIterator)
#create_neighbor()
-> DequeReverseIterator
+get index() -> size_t
+set value(T)
List container and its Iterators
T
Vector
extends Array<T>
implements IArrayContainer<T>
+override super::constructor
+constructor(size_t, T)
+override super::assign
+clear()
+override super::insert
+override super::erase
1 0
1 N
T
VectorIterator
extends Iterator<T>
#index_: size_t
+constructor(Vector<T>, size_t)
+prev() -> VectorIterator
+next() -> VectorIterator
+advance(size_t) -> VectorIterator
+getindex(): size_t
+get value(): T
+set value(T)
+equal_to(VectorIterator) -> boolean
+swap(VectorIterator)
1 0
1 1
T
VectorReverseIterator
extends ReverseIterator<Vector<T>>
implements IReverseIterator<T>
+constructor(VectorIterator)
#create_neighbor()
-> VectorReverseIterator
+get index() -> size_t
+set value(T)


Set Containers
Final Sets
HashSet
extends SpecifiedSet<T>
#hash_buckets_: SetHashBuckets
+using super::constructor
#init()
template <U extends T,
XIterator extends Iterator<U>>
+assign(InputIterator, InputIterator)
+clear()
+find(T) -> SetIterator
+override super::push
+override super::insert
template <XIterator extends SetIterator<T>>
#handle_insert(XIterator, XIterator)
#handle_erase(XIterator, XIterator(
Tree(Multi)Set
extends SpecifiedSet<T>
#tree_: PairTree
+using super::constructor
#init()
template <U extends T,
XIterator extends Iterator<U>>
+assign(InputIterator, InputIterator)
+clear()
+find(T) -> SetIterator
+lower_bound(T) -> SetIterator
+upper_bound(T) -> SetIterator
+equal_range(T)
-> Pair<SetIterator, SetIterator>
+override super::insert
template <XIterator extends SetIterator<T>>
#handle_insert(XIterator, XIterator)
#handle_erase(XIterator, XIterator(
PriorityQueue
extends TreeMultiSet<T>
#container_: TreeMultiSet<T>
+constructor()
+constructor(T[])
+constructor(IContainer<T>)
+constructor(Iterator, Iterator)
+top() -> T
+size() -> size_t
+empty() -> boolean
+push(T)
+pop()
Abstract Set Containers
SetContainer
extends Container<T>
#data_: List<T>
+constructor()
+constructor(Array<T>)
+constructor(IContainer<T>)
template <U extends T,
InputIterator extends Iterator<T>>
+constructor(InputIterator, InputIterator)
+assign(InputIterator, InputIterator)
#init()
+clear()
+find(T) -> SetIterator
+begin() -> SetIterator
+end() -> SetIterator
+rbegin() -> ReverseSetIterator
+rend() -> ReverseSetIterator
+count(T) -> size_t
+has(T) -> boolean
+size() -> size_t
+push(Pair<L, U>[]): size_t
+insert(SetIterator, T) -> SetIterator
template <U extends T,
XIterator extends Iterator<U>>
+insert(InputIterator, InputIterator)
+erase(T) -> size_t
template <XIterator extends SetIterator>
+erase(XIterator, XIterator)
template <XIterator extends SetIterator<Key, T>>
#handle_insert(XIterator, XIterator)
#handle_erase(XIterator, XIterator)
Specified Setss about uniqueness
UniqueSet
extends SetContainer< T>
+using super::constructor
+count(Key) -> size_t
+using super::insert
+insert(T) -> Pair<SetIterator, boolean>
+swap(UniqueSet)
MultiSet
extends SetContainer<T>
+using super::constructor
+using super::insert
+insert(T) -> SetIterator
+swap(MultiSet)
Iterators
SetIterator
extends Iterator<T>
#list_it_: ListIterator<T>
+constructor(SetContainer, ListIterator)
+prev() -> SetIterator
+next() -> SetIterator
+advance(size_t) -> SetIterator
+get value() -> Pair<Key, T>
+get first() -> Key
+get second() -> T
+set second(T)
+equal_to(Set_Iterator) -> boolean
+less(SetIterator) -> boolean
+hash() -> size_t
SetReverseIterator
extends ReverseIterator
<SetContainer<T>>
+constructor(SetIterator)
#create_reverse_iterator()
-> SetReverseIterator
Hash functions
MapHashBuckets
extends HashBuckets
<SetIterator<T>>
-set_: SetContainer< T>
+constructor(SetContainer<T>)
+find(T) -> SetIterator
HashBuckets
#buckets_: Array<Array<T>>
#item_size_: size_t
+constructor()
+reserve(size_t)
+clear()
+at(size_t) -> Array<T>
-hash_index(T) -> size_t
+insert(T)
+erase(T)
Red-Black Tree
AtomicTree
extends XTree<T>
-compare_: (Key, Key) => boolean
+public constructor(Compare = std.less)
+using super::find
+find(SetIterator) -> XTreeNode
template <XIterator extends SetIterator<T>>
+is_less(XIterator, XIterator) -> boolean
+is_equal_to(XIterator, XIterator)
-> boolean
XTree
#root_: XTreeNode<T>
+public constructor()
+find(T) -> XTreeNode
#fetch_maximum(XTreeNode)
-> XTreeNode
-fetch_color(XTreeNode) -> Color
+insert(T)
+erase(T)
-insert_case_{1~5}(XTreeNode)
-erase_case_{1~6}(XTreeNode)
#rotate_left(XTreeNode)
#rotate_right(XTreeNode)
#replace_node(XTreeNode, XTreeNode)
+is_less(T, T) -> boolean
+is_equal_to(T, T) -> boolean
XTreeNode
parent_: XTreeNode
left_: XTreeNode
right_: XTreeNode
value: T
color: Color
+constructor(T, Color)



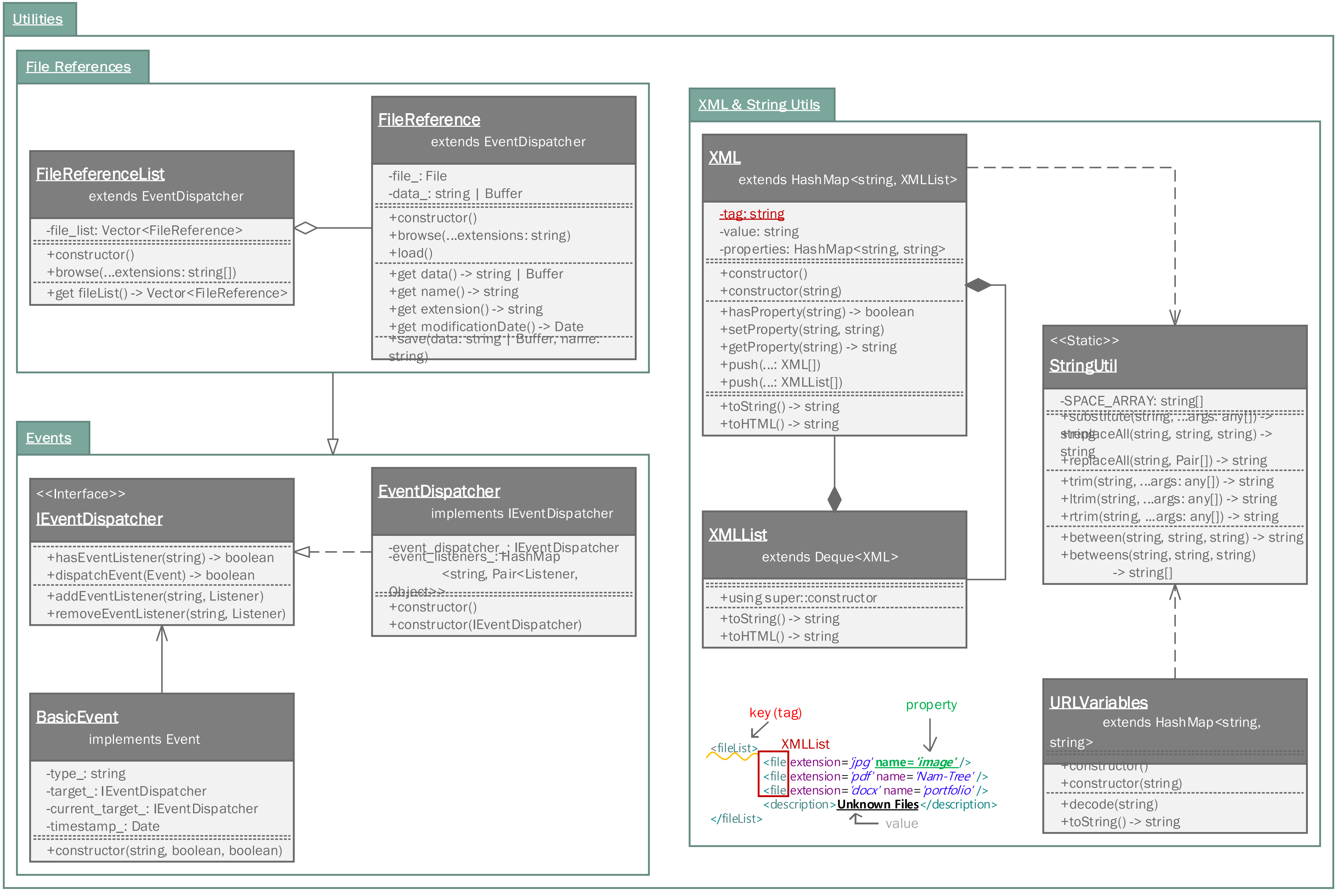
Map Containers
Final Maps
Abstract Map Containers
MapContainer
Key, T
extends Container<Pair<Key, T>>
#data_: List<Pair<Key, T>>
+constructor()
+constructor(Pair<Key, T>[])
+constructor(IContainer)
template <L extends Key, U extends T, XIterator extends Iterator<Pair<L, U>>>
+constructor(InputIterator, InputIterator)
+assign(InputIterator, InputIterator)
#init()
+clear()
+find(Key) -> MapIterator
+begin() -> MapIterator
+end() -> MapIterator
+rbegin() -> ReverseMapIterator
+rend() -> ReverseMapIterator
+count(Key) -> size_t
+has(Key) -> boolean
+size() -> size_t
+push(Pair<L, U>[]): size_t
+insert(MapIterator, Pair<Key, T>) -> MapIterator
template <L extends Key, U extends T, XIterator extends Iterator<Pair<L, U>>>
+insert(InputIterator, InputIterator)
+erase(Key) -> size_t
template <XIterator extends MapIterator>
+erase(XIterator, XIterator)
template <XIterator extends MapIterator<Key, T>>
#handle_insert(XIterator, XIterator)
#handle_erase(XIterator, XIterator)
Specified Maps about uniqueness
UniqueMap
Key, T
extends MapContainer<<Key, T>
+using super::constructor
+count(Key) -> size_t
+get(Key) -> T
+set(Key, T)
+using super::insert
+insert(Pair<Key, T>) -> Pair<MapIterator, boolean>
+swap(UniqueMap)
MultiMap
Key, T
extends MapContainer<<Key, T>
+using super::constructor
+using super::insert
+insert(Pair<Key, T>) -> MapIterator
+swap(MultiMap)
HashMap
Key, T
extends SpecifiedMap<Key, T>
#hash_buckets_: MapHashBuckets
+override super::constructor
#init()
template <L extends Key, U extends T, XIterator extends Iterator<Pair<L, U>>
+assign(InputIterator, InputIterator)
+clear()
+find(Key) -> MapIterator
+override super::push
+override super::insert
template <XIterator extends MapIterator<Key, T>>
#handle_insert(XIterator, XIterator)
#handle_erase(XIterator, XIterator(
Tree(Multi)Map
Key, T
extends SpecifiedMap<Key, T>
#tree_: PairTree
+override super::constructor
#init()
template <L extends Key, U extends T, XIterator extends Iterator<Pair<L, U>>
+assign(InputIterator, InputIterator)
+clear()
+find(Key) -> MapIterator
+lower_bound(Key) -> MapIterator
+upper_bound(Key) -> MapIterator
+equal_range(Key) -> Pair<MapIterator, MapIterator>
+override super::insert
template <XIterator extends MapIterator<Key, T>>
#handle_insert(XIterator, XIterator)
#handle_erase(XIterator, XIterator(
Hash functions
MapHashBuckets
Key, T
extends HashBuckets <MapIterator<Key, T>>
-map_: MapContainer<Key, T>
+constructor(MapContainer<Key, T>)
+find(Key) -> MapIterator
HashBuckets
T
#buckets_: Array<Array<T>>
#item_size_: size_t
+constructor()
+reserve(size_t)
+clear()
+at(size_t) -> Array<T>
-hash_index(T) -> size_t
+insert(T)
+erase(T)
Red-Black Tree
PairTree
Key, T
extends XTree<Pair<Key, T>>
-compare_: (Key, Key) => boolean
+public constructor(Compare = std.less)
+using super::find
+find(MapIterator) -> XTreeNode
template <XIterator extends MapIterator<Key, T>>
+is_less(XIterator, XIterator) -> boolean
+is_equal_to(XIterator, XIterator) -> boolean
XTree
T
#root_: XTreeNode<T>
+public constructor()
+find(T) -> XTreeNode
#fetch_maximum(XTreeNode) -> XTreeNode
-fetch_color(XTreeNode) -> Color
+insert(T)
+erase(T)
-insert_case_{1~5}(XTreeNode)
-erase_case_{1~6}(XTreeNode)
#rotate_left(XTreeNode)
#rotate_right(XTreeNode)
#replace_node(XTreeNode, XTreeNode)
+is_less(T, T) -> boolean
+is_equal_to(T, T) -> boolean
XTreeNode
T
parent_: XTreeNode
left_: XTreeNode
right_: XTreeNode
value: T
color: Color
+constructor(T, Color)
Iterators
MapIterator
Key, T
extends Iterator<Pair<Key, T>>
#list_it_: ListIterator<Pair<Key, T>>
+constructor(MapContainer, ListIterator)
+prev() -> MapIterator
+next() -> MapIterator
+advance(size_t) -> MapIterator
+get value() -> Pair<Key, T>
+get first() -> Key
+get second() -> T
+set second(T)
+equal_to(MapIterator) -> boolean
+less(MapIterator) -> boolean
+hash() -> size_t
+swap(MapIterator)
MapReverseIterator
Key, T
extends ReverseIterator <MapContainer<Key, T>>
+constructor(MapIterator)
#create_neighbor() -> MapReverseIterator
+get first() -> Key
+get second() -> T
+set second(T)

Library

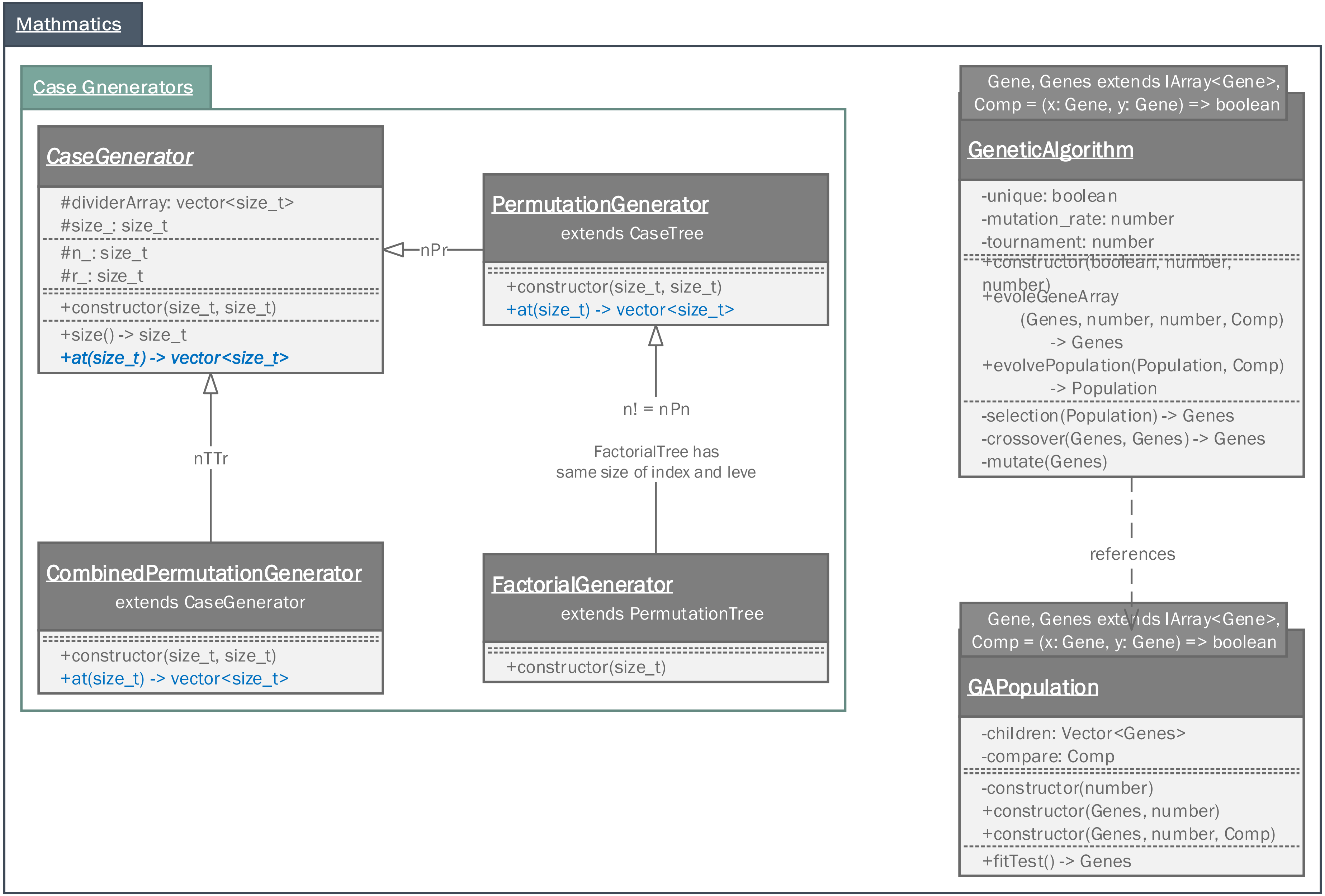
Helpful library objects

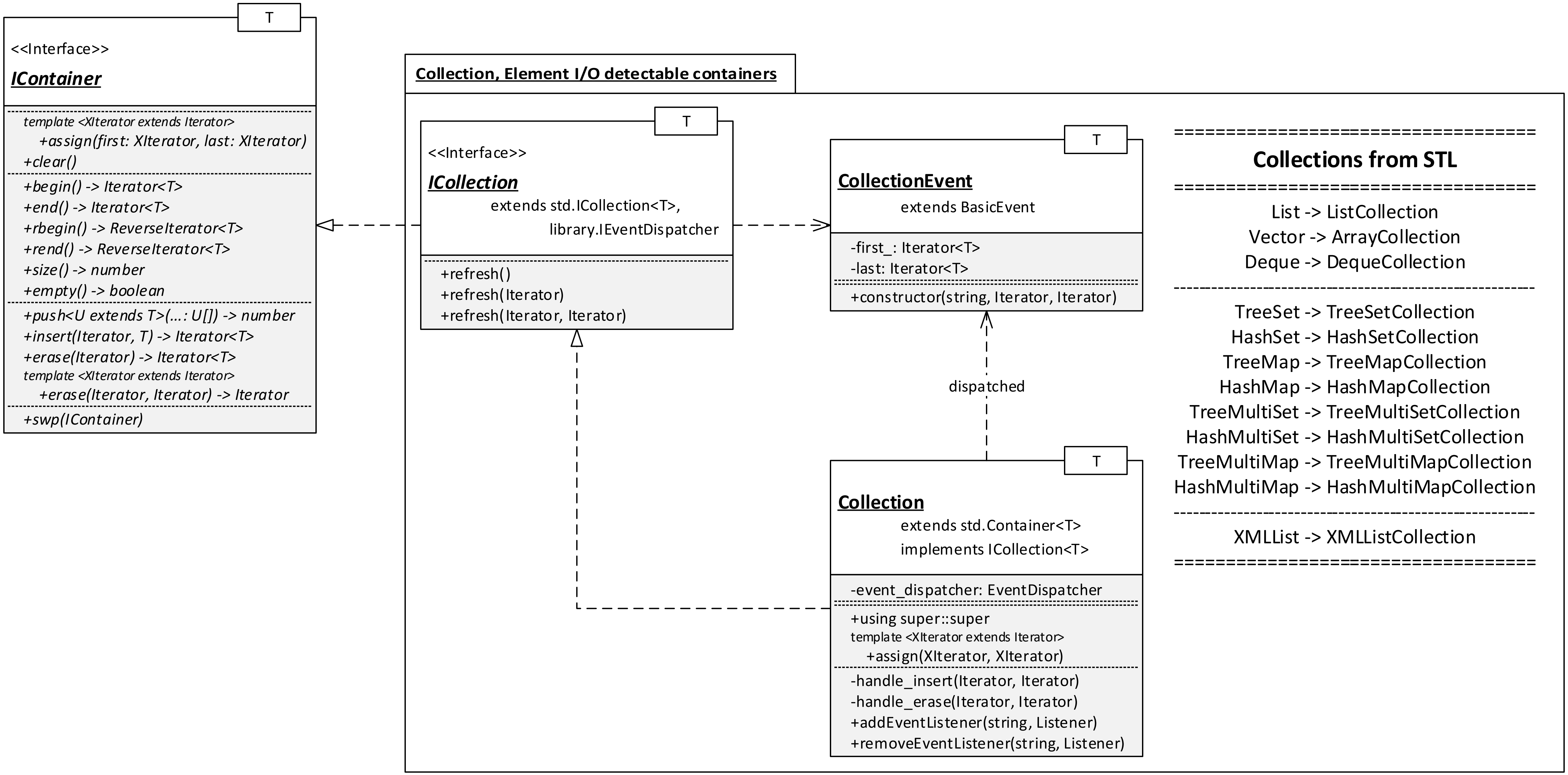
Utilities

Mathematics



Utilities
File References
FileReferenceList
extends EventDispatcher
-file_list: Vector<FileReference>
+constructor()
+browse(...extensions: string[])
+get fileList() -> Vector<FileReference>
FileReference
extends EventDispatcher
-file_: File
-data_: string | Buffer
+constructor()
+browse(...extensions: string)
+load()
+get data() -> string | Buffer
+get name() -> string
+get extension() -> string
+get modificationDate() -> Date
+save(data: string | Buffer, name: string)
Events
<<Interface>>
IEventDispatcher
+hasEventListener(string) -> boolean
+dispatchEvent(Event) -> boolean
+addEventListener(string, Listener)
+removeEventListener(string, Listener)
EventDispatcher
implements IEventDispatcher
-event_dispatcher_: IEventDispatcher
-event_listeners_: HashMap
<string, Pair<Listener, Object>>
+constructor()
+constructor(IEventDispatcher)
BasicEvent
implements Event
-type_: string
-target_: IEventDispatcher
-current_target_: IEventDispatcher
-timestamp_: Date
+constructor(string, boolean, boolean)
XML & String Utils
XML
extends HashMap<string, XMLList>
-tag: string
-value: string
-properties: HashMap<string, string>
+constructor()
+constructor(string)
+hasProperty(string) -> boolean
+setProperty(string, string)
+getProperty(string) -> string
+push(...: XML[])
+push(...: XMLList[])
+toString() -> string
+toHTML() -> string
XMLList
extends Deque<XML>
+using super::constructor
+toString() -> string
+toHTML() -> string
<<Static>>
StringUtil
-SPACE_ARRAY: string[]
+substitute(string, ...args: any[]) -> string
+replaceAll(string, string, string) -> string
+replaceAll(string, Pair[]) -> string
+trim(string, ...args: any[]) -> string
+ltrim(string, ...args: any[]) -> string
+rtrim(string, ...args: any[]) -> string
+between(string, string, string) -> string
+betweens(string, string, string)
-> string[]
URLVariables
extends HashMap<string, string>
+constructor()
+constructor(string)
+decode(string)
+toString() -> string
key (tag)
property
XMLList
<fileList>
<file extension='jpg' name='image' />
<file extension='pdf' name='Nam-Tree' />
<file extension='docx' name='portfolio' />
<description>Unknown Files</description>
</fileList>
value


Mathmatics
Case Gnenerators
CaseGenerator
#dividerArray: vector<size_t>
#size_: size_t
#n_: size_t
#r_: size_t
+constructor(size_t, size_t)
+size() -> size_t
+at(size_t) -> vector<size_t>
nPr
PermutationGenerator
extends CaseTree
+constructor(size_t, size_t)
+at(size_t) -> vector<size_t>
nTTr
n! = nPn
FactorialTree has
same size of index and leve
CombinedPermutationGenerator
extends CaseGenerator
+constructor(size_t, size_t)
+at(size_t) -> vector<size_t>
FactorialGenerator
extends PermutationTree
+constructor(size_t)
Gene, Genes extends IArray<Gene>,
Comp = (x: Gene, y: Gene) => boolean
GeneticAlgorithm
-unique: boolean
-mutation_rate: number
-tournament: number
+constructor(boolean, number, number)
+evoleGeneArray
(Genes, number, number, Comp)
-> Genes
+evolvePopulation(Population, Comp)
-> Population
-selection(Population) -> Genes
-crossover(Genes, Genes) -> Genes
-mutate(Genes)
references
Gene, Genes extends IArray<Gene>,
Comp = (x: Gene, y: Gene) => boolean
GAPopulation
-children: Vector<Genes>
-compare: Comp
-constructor(number)
+constructor(Genes, number)
+constructor(Genes, number, Comp)
+fitTest() -> Genes

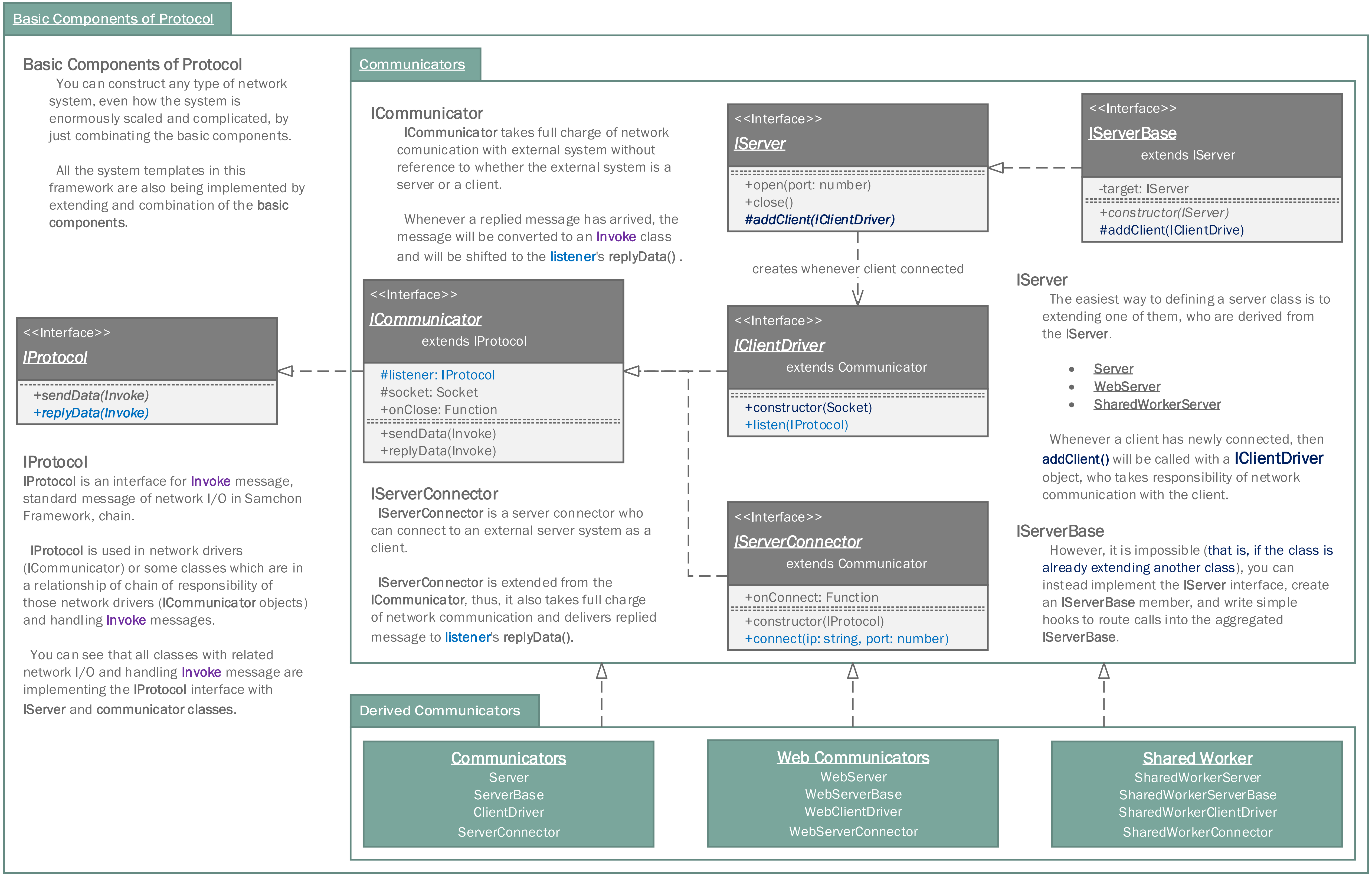


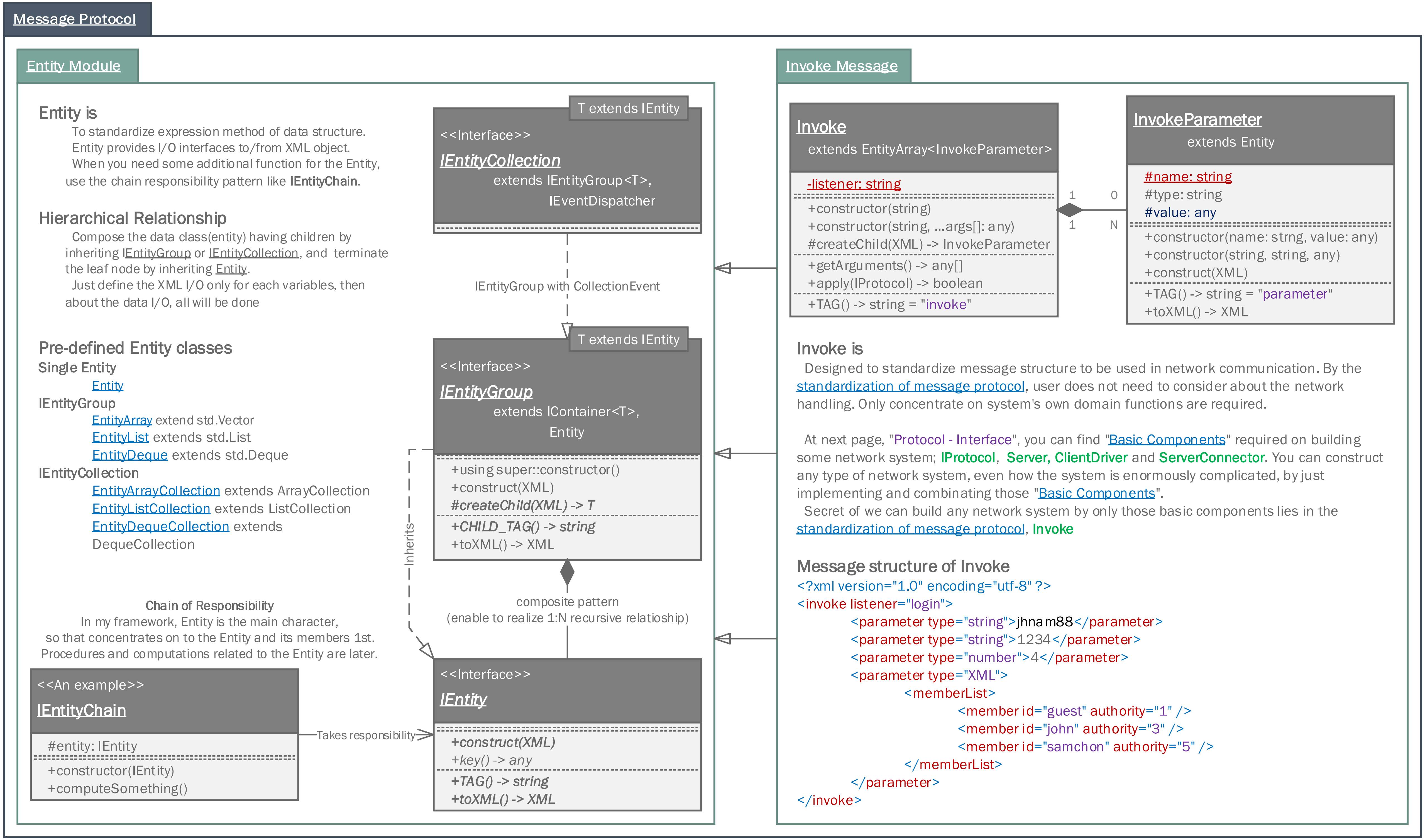
T
<<Interface>>
IContainer
template <XIterator extends Iterator>
+assign(first: XIterator, last: XIterator)
+clear()
+begin() -> Iterator<T>
+end() -> Iterator<T>
+rbegin() -> ReverseIterator<T>
+rend() -> ReverseIterator<T>
+size() -> number
+empty() -> boolean
+push<U extends T>(...: U[]) -> number
+insert(Iterator, T) -> Iterator<T>
+erase(Iterator) -> Iterator<T>
template <XIterator extends Iterator>
+erase(Iterator, Iterator) -> Iterator
+swp(IContainer)
Collection, Element I/O detectable containers
T
<<Interface>>
ICollection
extends std.ICollection<T>,
library.IEventDispatcher
+refresh()
+refresh(Iterator)
+refresh(Iterator, Iterator)
T
CollectionEvent
extends BasicEvent
-first_: Iterator<T>
-last: Iterator<T>
+constructor(string, Iterator, Iterator)
dispatched
T
Collection
extends std.Container<T>
implements ICollection<T>
-event_dispatcher: EventDispatcher
+using super::super
template <XIterator extends Iterator>
+assign(XIterator, XIterator)
-handle_insert(Iterator, Iterator)
-handle_erase(Iterator, Iterator)
+addEventListener(string, Listener)
+removeEventListener(string, Listener)
Collections from STL
List -> ListCollection
Vector -> ArrayCollection
Deque -> DequeCollection
TreeSet -> TreeSetCollection
HashSet -> HashSetCollection
TreeMap -> TreeMapCollection
HashMap -> HashMapCollection
TreeMultiSet -> TreeMultiSetCollection
HashMultiSet -> HashMultiSetCollection
TreeMultiMap -> TreeMultiMapCollection
HashMultiMap -> HashMultiMapCollection
XMLList -> XMLListCollection

Protocol

Object Oriented Network

Basic Components
Message Protocol


Basic Components of Protocol
Basic Components of Protocol
You can construct any type of network system, even how the system is enormously scaled and complicated, by just combinating the basic components.
All the system templates in this framework are also being implemented by extending and combination of the basic components.
Communicators
ICommunicator
ICommunicator takes full charge of network comunication with external system without reference to whether the external system is a server or a client.
Whenever a replied message has arrived, the message will be converted to an Invoke class and will be shifted to the listener's replyData() .
<<Interface>>
IServer
+open(port: number)
+close()
#addClient(IClientDriver)
<<Interface>>
IServerBase
extends IServer
-target: IServer
+constructor(IServer)
#addClient(IClientDrive)
creates whenever client connected
<<Interface>>
IProtocol
+sendData(Invoke)
+replyData(Invoke)
<<Interface>>
ICommunicator
extends IProtocol
#listener: IProtocol
#socket: Socket
+onClose: Function
+sendData(Invoke)
+replyData(Invoke)
<<Interface>>
IClientDriver
extends Communicator
+constructor(Socket)
+listen(IProtocol)
IServer
The easiest way to defining a server class is to extending one of them, who are derived from the IServer.
• Server
• WebServer
• SharedWorkerServer
Whenever a client has newly connected, then addClient() will be called with a IClientDriver object, who takes responsibility of network communication with the client.
IProtocol
IProtocol is an interface for Invoke message, standard message of network I/O in Samchon Framework, chain.
IProtocol is used in network drivers (ICommunicator) or some classes which are in a relationship of chain of responsibility of those network drivers (ICommunicator objects) and handling Invoke messages.
You can see that all classes with related network I/O and handling Invoke message are implementing the IProtocol interface with IServer and communicator classes.
IServerConnector
IServerConnector is a server connector who can connect to an external server system as a client.
IServerConnector is extended from the ICommunicator, thus, it also takes full charge of network communication and delivers replied message to listener's replyData().
<<Interface>>
IServerConnector
extends Communicator
+onConnect: Function
+constructor(IProtocol)
+connect(ip: string, port: number)
IServerBase
However, it is impossible (that is, if the class is already extending another class), you can instead implement the IServer interface, create an IServerBase member, and write simple hooks to route calls into the aggregated IServerBase.
Derived Communicators
Communicators
Server
ServerBase
ClientDriver
ServerConnector
Web Communicators
WebServer
WebServerBase
WebClientDriver
WebServerConnector
Shared Worker
SharedWorkerServer
SharedWorkerServerBase
SharedWorkerClientDriver
SharedWorkerConnector

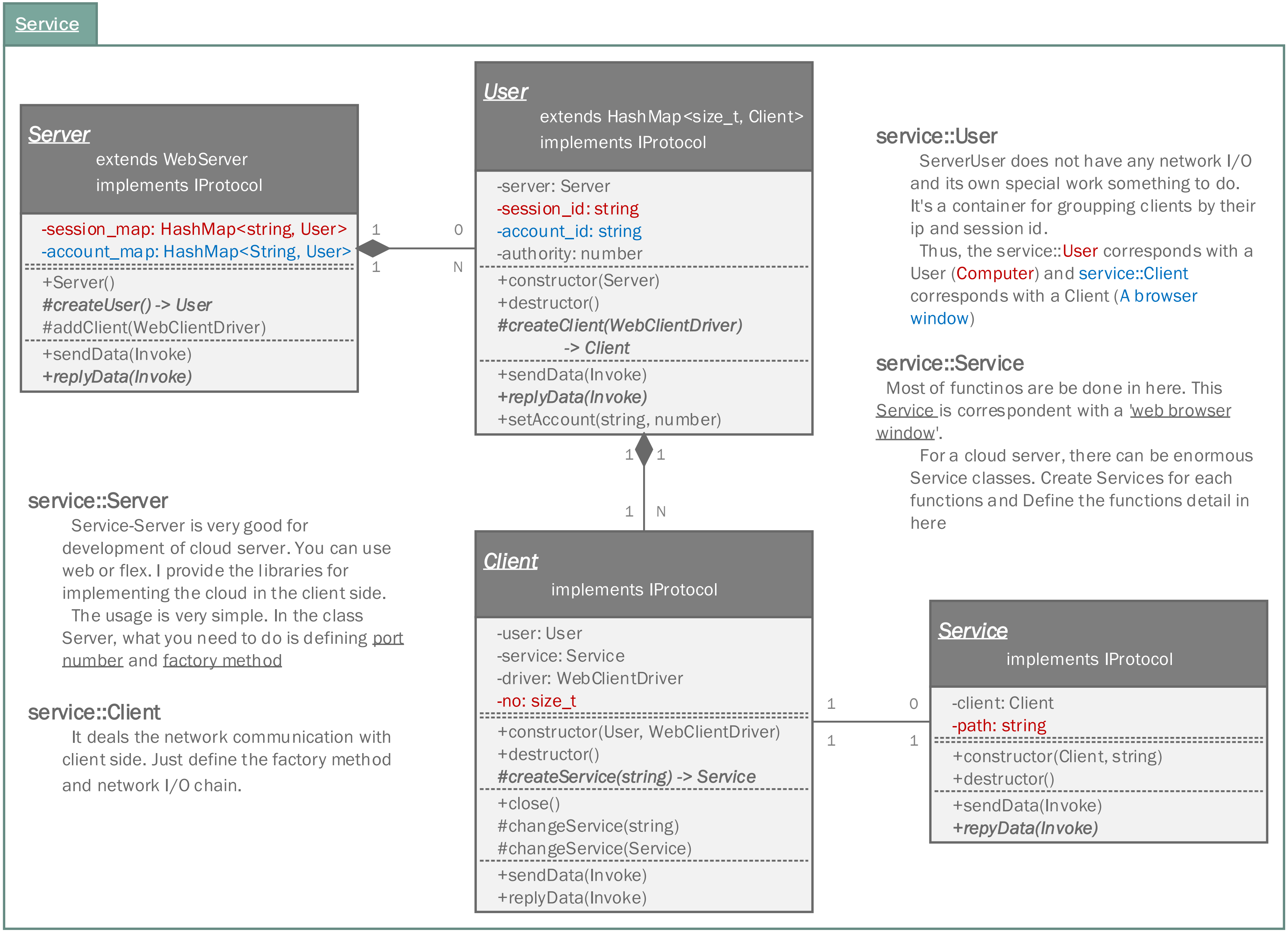


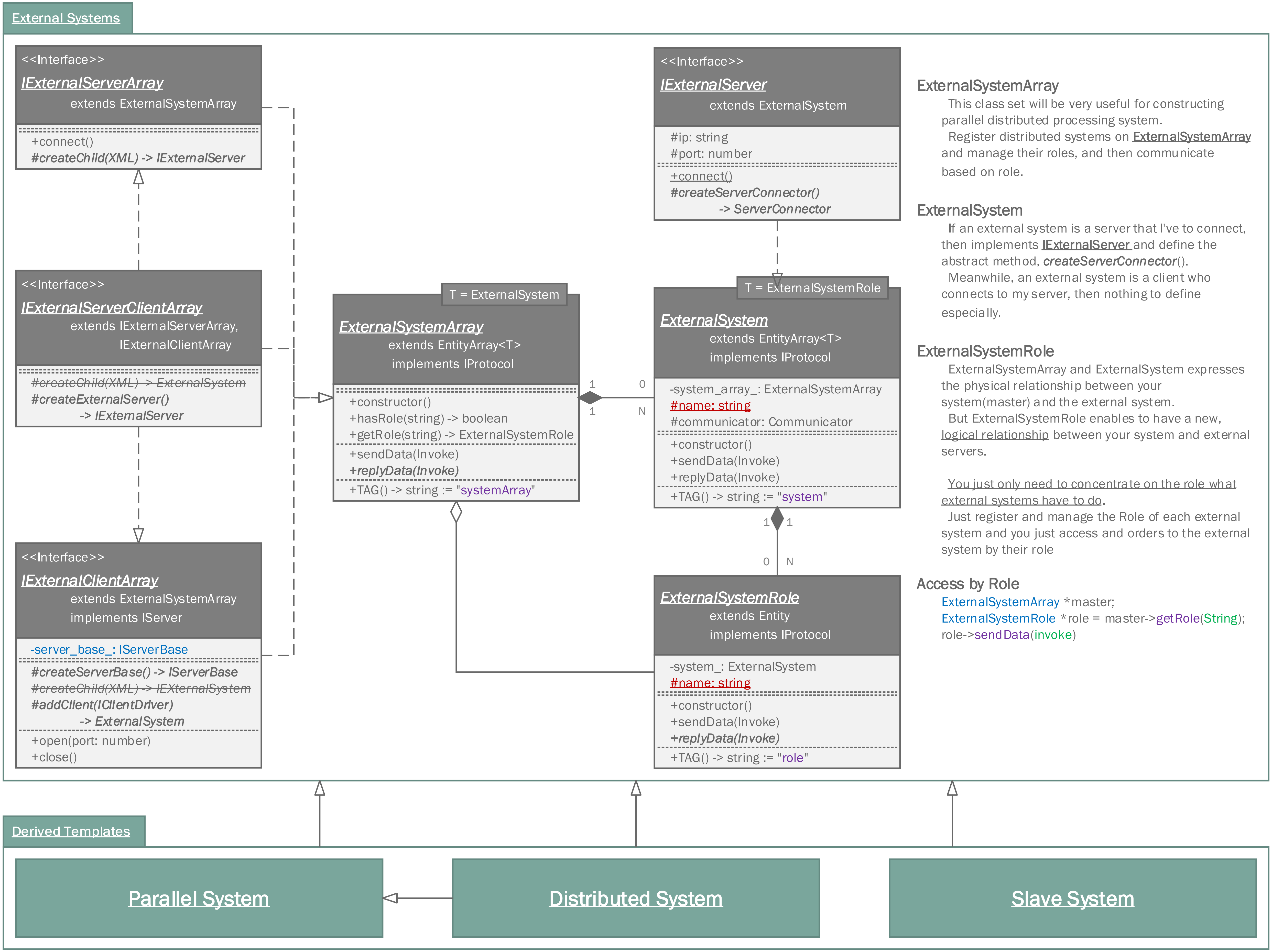

```xml
<?xml version="1.0" encoding="utf-8" ?>
<invoke listener="login">
	<parameter type="string">jhnam88</parameter>
	<parameter type="string">1234</parameter>
	<parameter type="number">4</parameter>
	<parameter type="XML">
		<memberList>
			<member id="guest" authority="1" />
			<member id="john" authority="3" />
			<member id="samchon" authority="5" />
		</memberList>
	</parameter>
</invoke>
```

Templates

Pre-defined Network System Modules

Cloud Service
External Systems
Parallel Processing System
Distributed Processing System


Service
Server
extends WebServer
implements IProtocol
-session_map: HashMap<string, User>
-account_map: HashMap<String, User>
+Server()
#createUser() -> User
#addClient(WebClientDriver)
+sendData(Invoke)
+replyData(Invoke)
1
1
0
N
User
extends HashMap<size_t, Client>
implements IProtocol
-server: Server
-session_id: string
-account_id: string
-authority: number
+constructor(Server)
+destructor()
#createClient(WebClientDriver)
-> Client
+sendData(Invoke)
+replyData(Invoke)
+setAccount(string, number)
1
1
1
N
Client
implements IProtocol
-user: User
-service: Service
-driver: WebClientDriver
-no: size_t
+constructor(User, WebClientDriver)
+destructor()
#createService(string) -> Service
+close()
#changeService(string)
#changeService(Service)
+sendData(Invoke)
+replyData(Invoke)
1
1
0
1
Service
implements IProtocol
-client: Client
-path: string
+constructor(Client, string)
+destructor()
+sendData(Invoke)
+repyData(Invoke)
service::User
ServerUser does not have any network I/O and its own special work something to do. It's a container for groupping clients by their ip and session id.
Thus, the service::User corresponds with a User (Computer) and service::Client corresponds with a Client (A browser window)
service::Service
Most of functinos are be done in here. This Service is correspondent with a 'web browser window'.
For a cloud server, there can be enormous Service classes. Create Services for each functions and Define the functions detail in here
service::Server
Service-Server is very good for development of cloud server. You can use web or flex. I provide the libraries for implementing the cloud in the client side.
The usage is very simple. In the class Server, what you need to do is defining port number and factory method
service::Client
It deals the network communication with client side. Just define the factory method and network I/O chain.



ExternalSystemArray

This class set will be very useful for constructing parallel distributed processing system.

Register distributed systems on ExternalSystemArray and manage their roles, and then communicate based on role.

ExternalSystem

If an external system is a server that I've to connect, then implements IExternalServer and define the abstract method, *createServerConnector*().

Meanwhile, an external system is a client who connects to my server, then nothing to define especially.

ExternalSystemRole

ExternalSystemArray and ExternalSystem expresses the physical relationship between your system(master) and the external system.

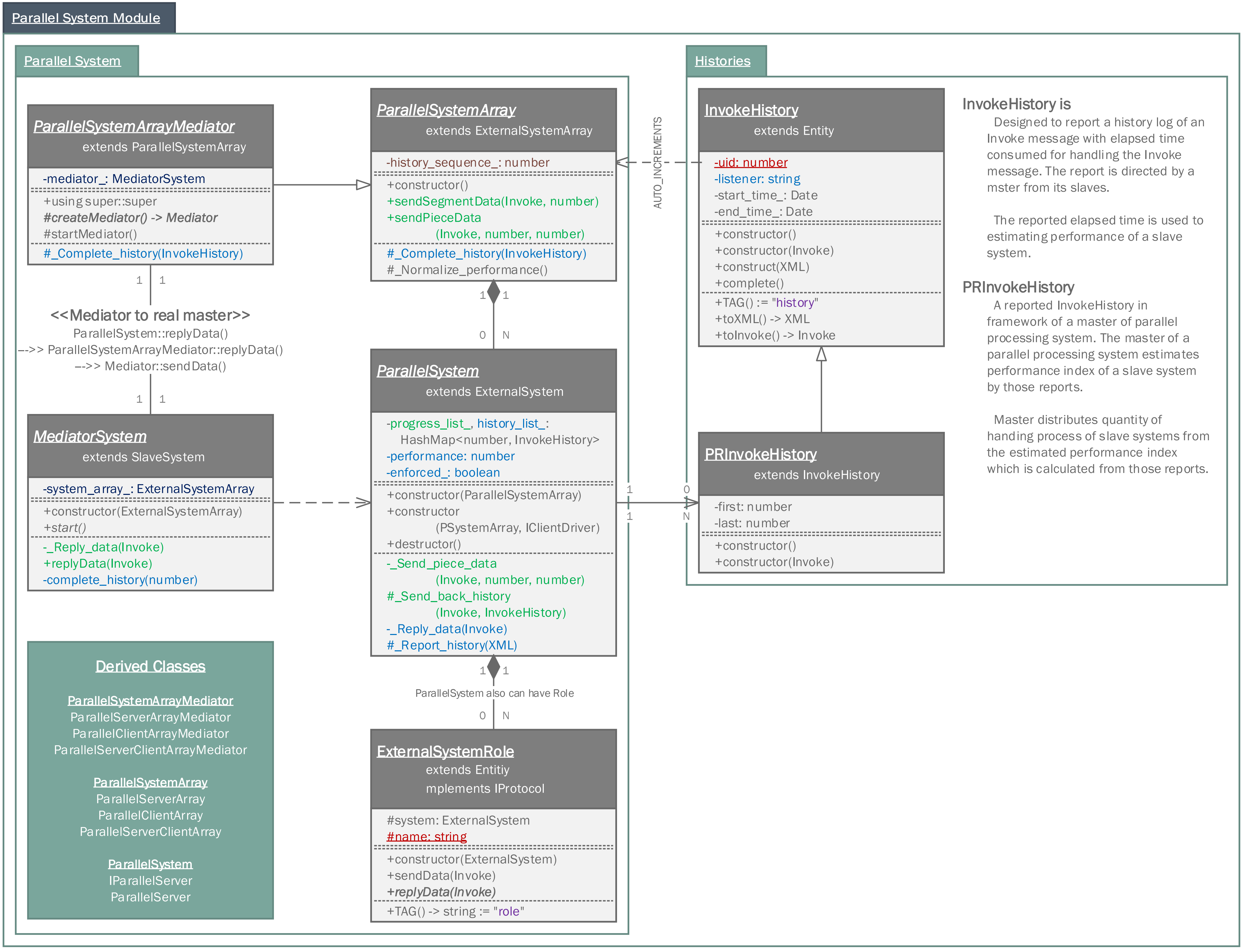
But ExternalSystemRole enables to have a new, logical relationship between your system and external servers.

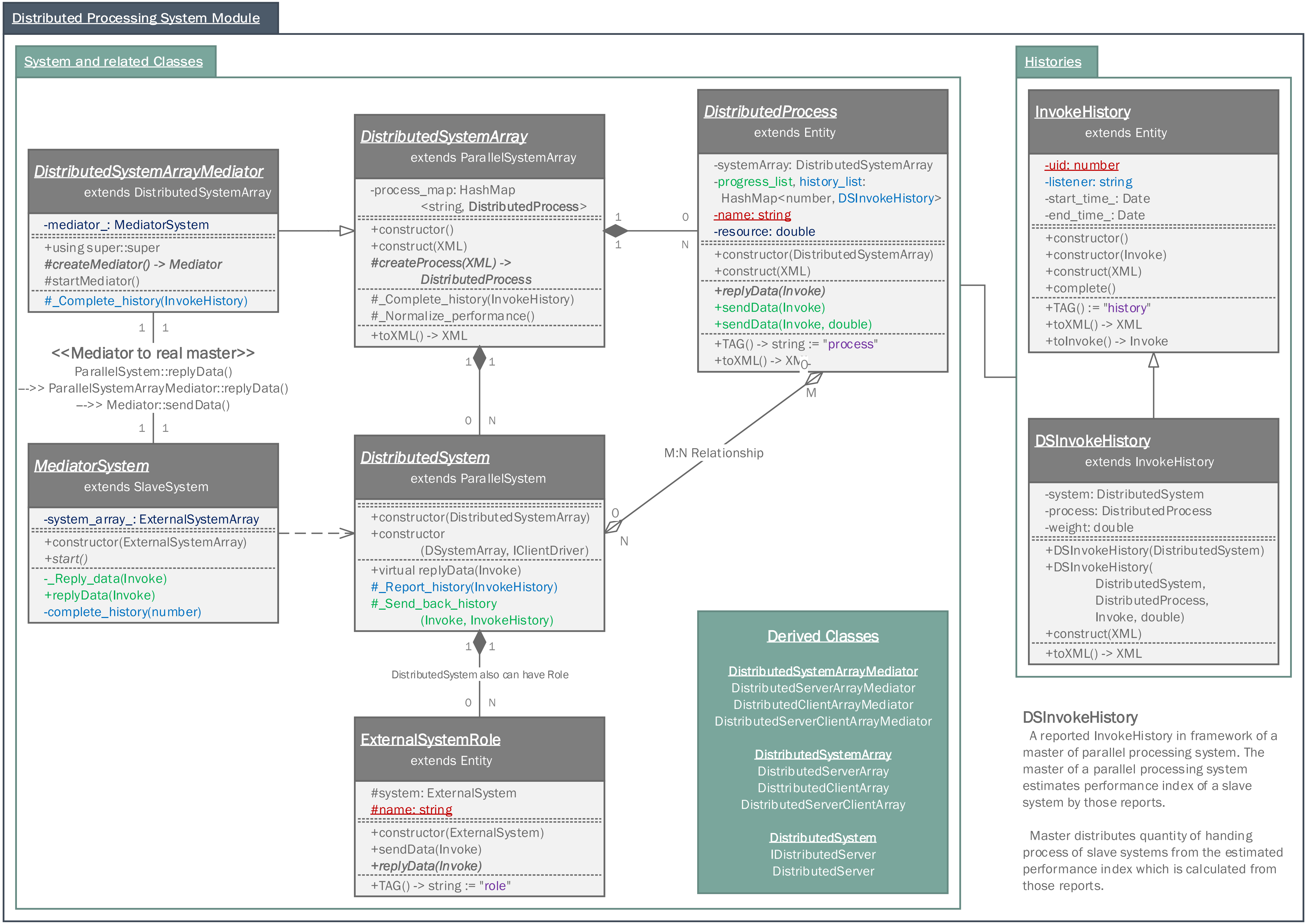
You just only need to concentrate on the role what external systems have to do.

Just register and manage the Role of each external system and you just access and orders to the external system by their role

Access by Role

```
ExternalSystemArray *master;
ExternalSystemRole *role = master->getRole(String);
role->sendData(invoke)
```

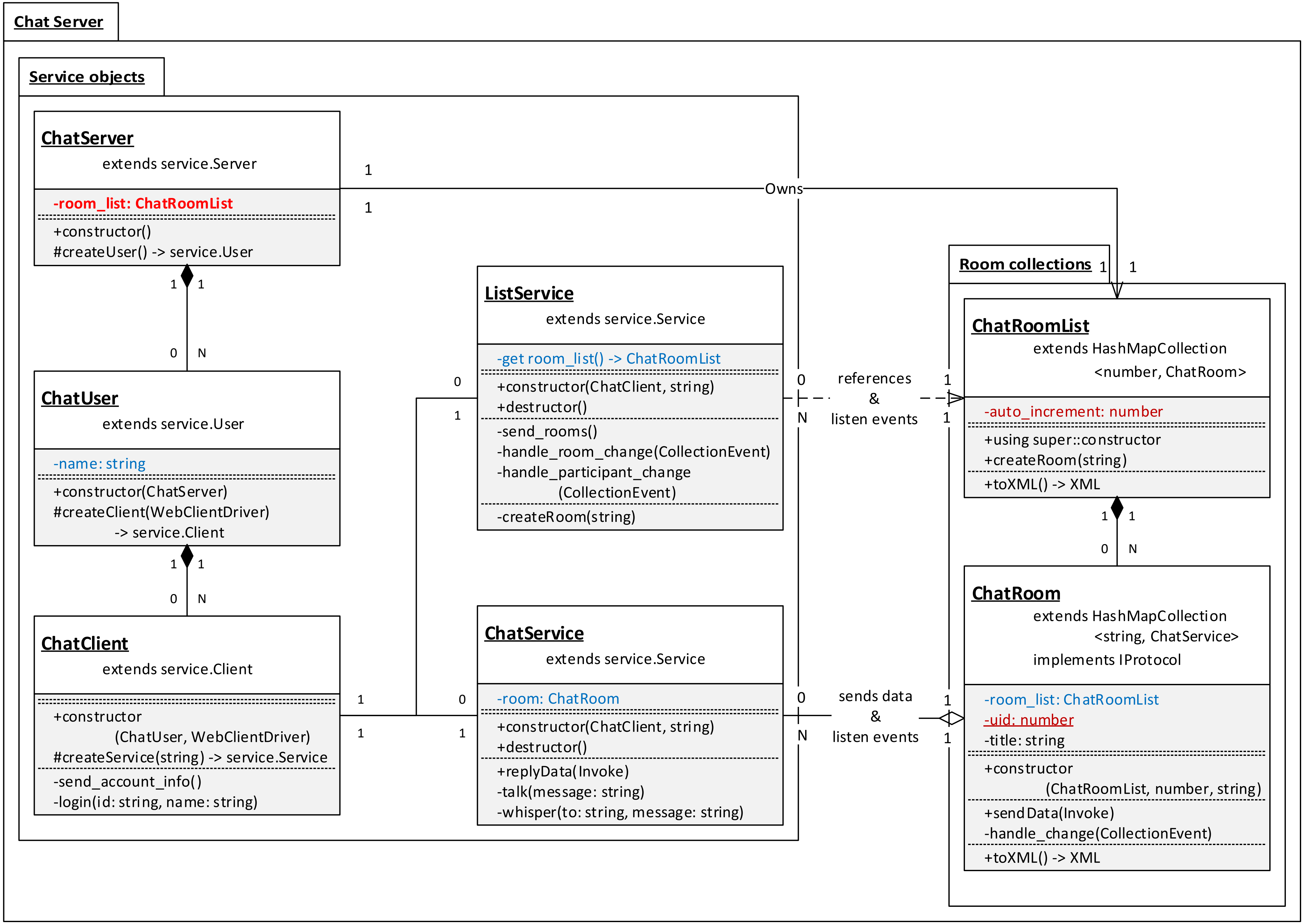

Parallel System Module
Parallel System
Histories
ParallelSystemArrayMediator
extends ParallelSystemArray
-mediator_: MediatorSystem
+using super::super
#createMediator() -> Mediator
#startMediator()
#_Complete_history(InvokeHistory)
<<Mediator to real master>>
ParallelSystem::replyData()
-->> ParallelSystemArrayMediator::replyData()
-->> Mediator::sendData()
MediatorSystem
extends SlaveSystem
-system_array_: ExternalSystemArray
+constructor(ExternalSystemArray)
+start()
-_Reply_data(Invoke)
+replyData(Invoke)
-complete_history(number)
Derived Classes
ParallelSystemArrayMediator
ParallelServerArrayMediator
ParallelClientArrayMediator
ParallelServerClientArrayMediator
ParallelSystemArray
ParallelServerArray
ParallelClientArray
ParallelServerClientArray
ParallelSystem
IParallelServer
ParallelServer
ParallelSystemArray
extends ExternalSystemArray
-history_sequence_: number
+constructor()
+sendSegmentData(Invoke, number)
+sendPieceData
(Invoke, number, number)
#_Complete_history(InvokeHistory)
#_Normalize_performance()
ParallelSystem
extends ExternalSystem
-progress_list_, history_list_:
HashMap<number, InvokeHistory>
-performance: number
-enforced_: boolean
+constructor(ParallelSystemArray)
+constructor
(PSystemArray, IClientDriver)
+destructor()
-_Send_piece_data
(Invoke, number, number)
#_Send_back_history
(Invoke, InvokeHistory)
-_Reply_data(Invoke)
#_Report_history(XML)
ParallelSystem also can have Role
ExternalSystemRole
extends Entitiy
mplements IProtocol
#system: ExternalSystem
#name: string
+constructor(ExternalSystem)
+sendData(Invoke)
+replyData(Invoke)
+TAG() -> string := "role"
AUTO_INCREMENTS
InvokeHistory
extends Entity
-uid: number
-listener: string
-start_time_: Date
-end_time_: Date
+constructor()
+constructor(Invoke)
+construct(XML)
+complete()
+TAG() := "history"
+toXML() -> XML
+toInvoke() -> Invoke
PRInvokeHistory
extends InvokeHistory
-first: number
-last: number
+constructor()
+constructor(Invoke)
InvokeHistory is
Designed to report a history log of an Invoke message with elapsed time consumed for handling the Invoke message. The report is directed by a mster from its slaves.
The reported elapsed time is used to estimating performance of a slave system.
PRInvokeHistory
A reported InvokeHistory in framework of a master of parallel processing system. The master of a parallel processing system estimates performance index of a slave system by those reports.
Master distributes quantity of handing process of slave systems from the estimated performance index which is calculated from those reports.

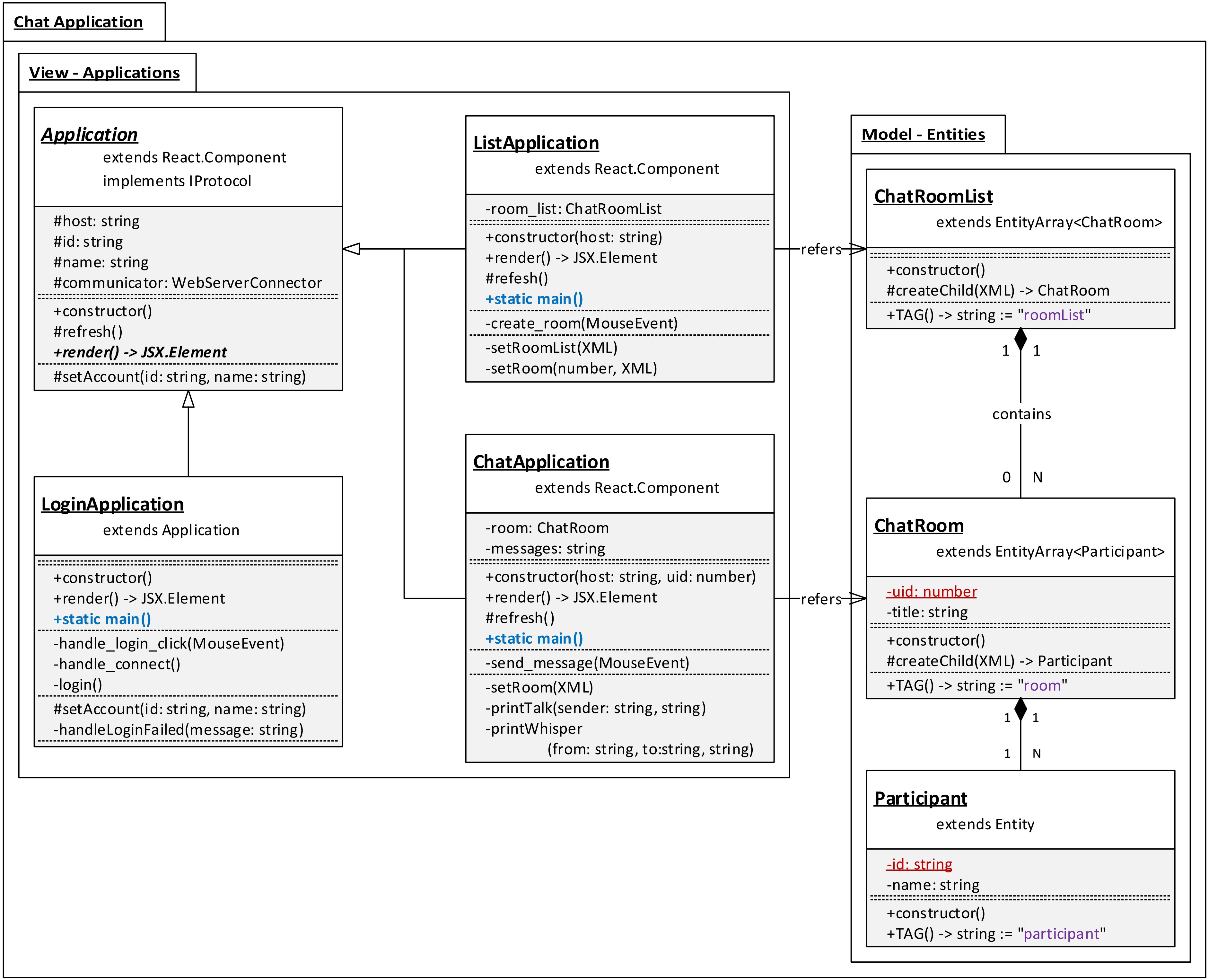

Distributed Processing System Module
System and related Classes
DistributedSystemArrayMediator
extends DistributedSystemArray
-mediator_: MediatorSystem
+using super::super
#createMediator() -> Mediator
#startMediator()
#_Complete_history(InvokeHistory)
DistributedSystemArray
extends ParallelSystemArray
-process_map: HashMap
<string, DistributedProcess>
+constructor()
+construct(XML)
#createProcess(XML) ->
DistributedProcess
#_Complete_history(InvokeHistory)
#_Normalize_performance()
+toXML() -> XML
DistributedProcess
extends Entity
-systemArray: DistributedSystemArray
-progress_list, history_list:
HashMap<number, DSInvokeHistory>
-name: string
-resource: double
+constructor(DistributedSystemArray)
+construct(XML)
+replyData(Invoke)
+sendData(Invoke)
+sendData(Invoke, double)
+TAG() -> string := "process"
+toXML() -> XML
<<Mediator to real master>>
ParallelSystem::replyData()
-->> ParallelSystemArrayMediator::replyData()
-->> Mediator::sendData()
MediatorSystem
extends SlaveSystem
-system_array_: ExternalSystemArray
+constructor(ExternalSystemArray)
+start()
-_Reply_data(Invoke)
+replyData(Invoke)
-complete_history(number)
DistributedSystem
extends ParallelSystem
+constructor(DistributedSystemArray)
+constructor
(DSystemArray, IClientDriver)
+virtual replyData(Invoke)
#_Report_history(InvokeHistory)
#_Send_back_history
(Invoke, InvokeHistory)
M:N Relationship
DistributedSystem also can have Role
ExternalSystemRole
extends Entity
#system: ExternalSystem
#name: string
+constructor(ExternalSystem)
+sendData(Invoke)
+replyData(Invoke)
+TAG() -> string := "role"
Derived Classes
DistributedSystemArrayMediator
DistributedServerArrayMediator
DistributedClientArrayMediator
DistributedServerClientArrayMediator
DistributedSystemArray
DistributedServerArray
DisttributedClientArray
DistributedServerClientArray
DistributedSystem
IDistributedServer
DistributedServer
Histories
InvokeHistory
extends Entity
-uid: number
-listener: string
-start_time_: Date
-end_time_: Date
+constructor()
+constructor(Invoke)
+construct(XML)
+complete()
+TAG() := "history"
+toXML() -> XML
+toInvoke() -> Invoke
DSInvokeHistory
extends InvokeHistory
-system: DistributedSystem
-process: DistributedProcess
-weight: double
+DSInvokeHistory(DistributedSystem)
+DSInvokeHistory(
DistributedSystem,
DistributedProcess,
Invoke, double)
+construct(XML)
+toXML() -> XML
DSInvokeHistory
A reported InvokeHistory in framework of a master of parallel processing system. The master of a parallel processing system estimates performance index of a slave system by those reports.
Master distributes quantity of handing process of slave systems from the estimated performance index which is calculated from those reports.

Examples

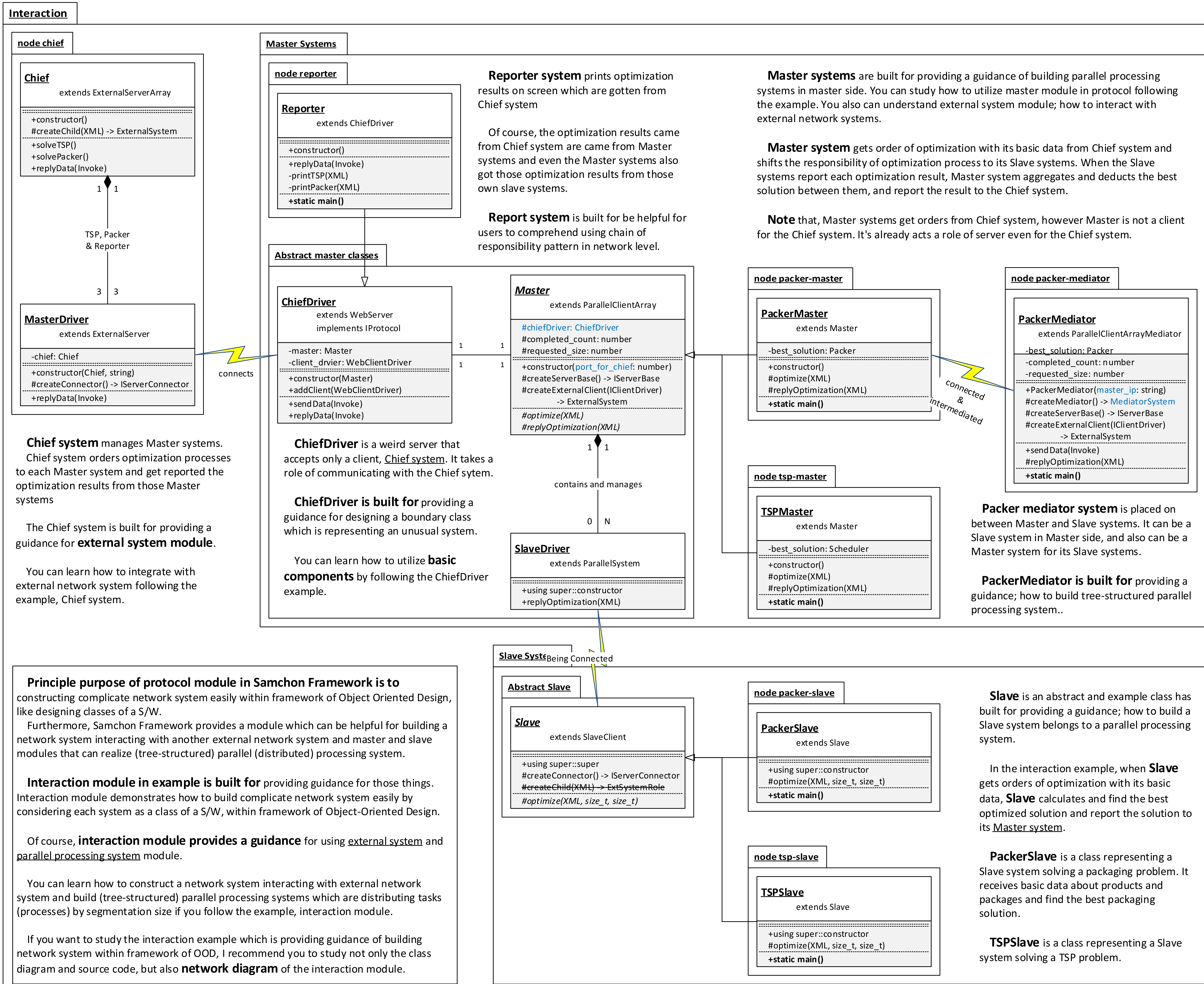
Guidance Projects

Chat Server & Application Interaction


Chat Server
Service objects
ChatServer
extends service.Server
-room_list: ChatRoomList
+constructor()
#createUser() -> service.User
ChatUser
extends service.User
-name: string
+constructor(ChatServer)
#createClient(WebClientDriver)
-> service.Client
ChatClient
extends service.Client
+constructor
(ChatUser, WebClientDriver)
#createService(string) -> service.Service
-send_account_info()
-login(id: string, name: string)
ListService
extends service.Service
-get room_list() -> ChatRoomList
+constructor(ChatClient, string)
+destructor()
-send_rooms()
-handle_room_change(CollectionEvent)
-handle_participant_change
(CollectionEvent)
-createRoom(string)
ChatService
extends service.Service
-room: ChatRoom
+constructor(ChatClient, string)
+destructor()
+replyData(Invoke)
-talk(message: string)
-whisper(to: string, message: string)
Owns
references
&
listen events
sends data
&
listen events
Room collections
ChatRoomList
extends HashMapCollection
<number, ChatRoom>
-auto_increment: number
+using super::constructor
+createRoom(string)
+toXML() -> XML
ChatRoom
extends HashMapCollection
<string, ChatService>
implements IProtocol
-room_list: ChatRoomList
-uid: number
-title: string
+constructor
(ChatRoomList, number, string)
+sendData(Invoke)
-handle_change(CollectionEvent)
+toXML() -> XML



Chat Application
View - Applications
Application
extends React.Component
implements IProtocol
#host: string
#id: string
#name: string
#communicator: WebServerConnector
+constructor()
#refresh()
+render() -> JSX.Element
#setAccount(id: string, name: string)
LoginApplication
extends Application
+constructor()
+render() -> JSX.Element
+static main()
-handle_login_click(MouseEvent)
-handle_connect()
-login()
#setAccount(id: string, name: string)
-handleLoginFailed(message: string)
ListApplication
extends React.Component
-room_list: ChatRoomList
+constructor(host: string)
+render() -> JSX.Element
#refesh()
+static main()
-create_room(MouseEvent)
-setRoomList(XML)
-setRoom(number, XML)
ChatApplication
extends React.Component
-room: ChatRoom
-messages: string
+constructor(host: string, uid: number)
+render() -> JSX.Element
#refresh()
+static main()
-send_message(MouseEvent)
-setRoom(XML)
-printTalk(sender: string, string)
-printWhisper
(from: string, to:string, string)
refers
refers
Model - Entities
ChatRoomList
extends EntityArray<ChatRoom>
+constructor()
#createChild(XML) -> ChatRoom
+TAG() -> string := "roomList"
1
1
contains
0
N
ChatRoom
extends EntityArray<Participant>
-uid: number
-title: string
+constructor()
#createChild(XML) -> Participant
+TAG() -> string := "room"
1
1
1
N
Participant
extends Entity
-id: string
-name: string
+constructor()
+TAG() -> string := "participant"


Interaction
node chief
Chief
extends ExternalServerArray
+constructor()
#createChild(XML) -> ExternalSystem
+solveTSP()
+solvePacker()
+replyData(Invoke)
1 1
TSP, Packer
& Reporter
3 3
MasterDriver
extends ExternalServer
-chief: Chief
+constructor(Chief, string)
#createConnector() -> IServerConnector
+replyData(Invoke)
connects
Chief system manages Master systems.
Chief system orders optimization processes to each Master system and get reported the optimization results from those Master systems
The Chief system is built for providing a guidance for external system module.
You can learn how to integrate with external network system following the example, Chief system.
Master Systems
node reporter
Reporter
extends ChiefDriver
+constructor()
+replyData(Invoke)
-printTSP(XML)
-printPacker(XML)
+static main()
Reporter system prints optimization results on screen which are gotten from Chief system
Of course, the optimization results came from Chief system are came from Master systems and even the Master systems also got those optimization results from those own slave systems.
Report system is built for be helpful for users to comprehend using chain of responsibility pattern in network level.
Master systems are built for providing a guidance of building parallel processing systems in master side. You can study how to utilize master module in protocol following the example. You also can understand external system module; how to interact with external network systems.
Master system gets order of optimization with its basic data from Chief system and shifts the responsibility of optimization process to its Slave systems. When the Slave systems report each optimization result, Master system aggregates and deducts the best solution between them, and report the result to the Chief system.
Note that, Master systems get orders from Chief system, however Master is not a client for the Chief system. It's already acts a role of server even for the Chief system.
Abstract master classes
ChiefDriver
extends WebServer
implements IProtocol
-master: Master
-client_drvier: WebClientDriver
+constructor(Master)
+addClient(WebClientDriver)
+sendData(Invoke)
+replyData(Invoke)
1 1
1 1
Master
extends ParallelClientArray
#chiefDriver: ChiefDriver
#completed_count: number
#requested_size: number
+constructor(port_for_chief: number)
#createServerBase() -> IServerBase
#createExternalClient(IClientDriver)
-> ExternalSystem
#optimize(XML)
#replyOptimization(XML)
1 1
contains and manages
0 N
SlaveDriver
extends ParallelSystem
+using super::constructor
+replyOptimization(XML)
ChiefDriver is a weird server that accepts only a client, Chief system. It takes a role of communicating with the Chief sytem.
ChiefDriver is built for providing a guidance for designing a boundary class which is representing an unusual system.
You can learn how to utilize basic components by following the ChiefDriver example.
node packer-master
PackerMaster
extends Master
-best_solution: Packer
+constructor()
#optimize(XML)
#replyOptimization(XML)
+static main()
connected
&
intermediated
node packer-mediator
PackerMediator
extends ParallelClientArrayMediator
-best_solution: Packer
-completed_count: number
-requested_size: number
+PackerMediator(master_ip: string)
#createMediator() -> MediatorSystem
#createServerBase() -> IServerBase
#createExternalClient(IClientDriver)
-> ExternalSystem
+sendData(Invoke)
#replyOptimization(XML)
+static main()
node tsp-master
TSPMaster
extends Master
-best_solution: Scheduler
+constructor()
#optimize(XML)
#replyOptimization(XML)
+static main()
Packer mediator system is placed on between Master and Slave systems. It can be a Slave system in Master side, and also can be a Master system for its Slave systems.
PackerMediator is built for providing a guidance; how to build tree-structured parallel processing system..
Principle purpose of protocol module in Samchon Framework is to constructing complicate network system easily within framework of Object Oriented Design, like designing classes of a S/W.
Furthermore, Samchon Framework provides a module which can be helpful for building a network system interacting with another external network system and master and slave modules that can realize (tree-structured) parallel (distributed) processing system.
Interaction module in example is built for providing guidance for those things. Interaction module demonstrates how to build complicate network system easily by considering each system as a class of a S/W, within framework of Object-Oriented Design.
Of course, interaction module provides a guidance for using external system and parallel processing system module.
You can learn how to construct a network system interacting with external network system and build (tree-structured) parallel processing systems which are distributing tasks (processes) by segmentation size if you follow the example, interaction module.
If you want to study the interaction example which is providing guidance of building network system within framework of OOD, I recommend you to study not only the class diagram and source code, but also network diagram of the interaction module.
Slave Syste
Being Connected
Abstract Slave
Slave
extends SlaveClient
+using super::super
#createConnector() -> IServerConnector
#createChild(XML) -> ExtSystemRole
#optimize(XML, size_t, size_t)
node packer-slave
PackerSlave
extends Slave
+using super::constructor
#optimize(XML, size_t, size_t)
+static main()
node tsp-slave
TSPSlave
extends Slave
+using super::constructor
#optimize(XML, size_t, size_t)
+static main()
Slave is an abstract and example class has built for providing a guidance; how to build a Slave system belongs to a parallel processing system.
In the interaction example, when Slave gets orders of optimization with its basic data, Slave calculates and find the best optimized solution and report the solution to its Master system.
PackerSlave is a class representing a Slave system solving a packaging problem. It receives basic data about products and packages and find the best packaging solution.
TSPSlave is a class representing a Slave system solving a TSP problem.