

Тutorial: многопользовательский режим (чат-комната)

Концепция логических машин платформы Лямбда-Мю 3 позволяет с легкостью решать задачи работы с многими пользователями:

- авторизация
- выделение ресурсов
- обработка запросов
- статистика
- пр.

Разберем взаимодействие платформы с несколькими клиентами.

Пример реализации

Чат-комната. Пользователи находятся в одной виртуальной комнате и обмениваются текстовыми сообщениями.

Репозиторий

[lm3.chat_example](#)

Исходные данные

Сторону клиента реализует Android-приложение с

- запрограммированным модулем связи с платформой
- протоколом связи, который рассмотрен ниже

Цель проекта

Разработка взаимодействия платформы Лямбда-Мю 3 с многими клиентами на конкретном примере.

Протокол запросов и ответов

Запрос:

```
{ Command = "DoAuthByName", Data = <string> }
```

Ответ (всем пользователям):

```
{ Command = "OnSendAll", Data = "Member connected: "..<string> }
```

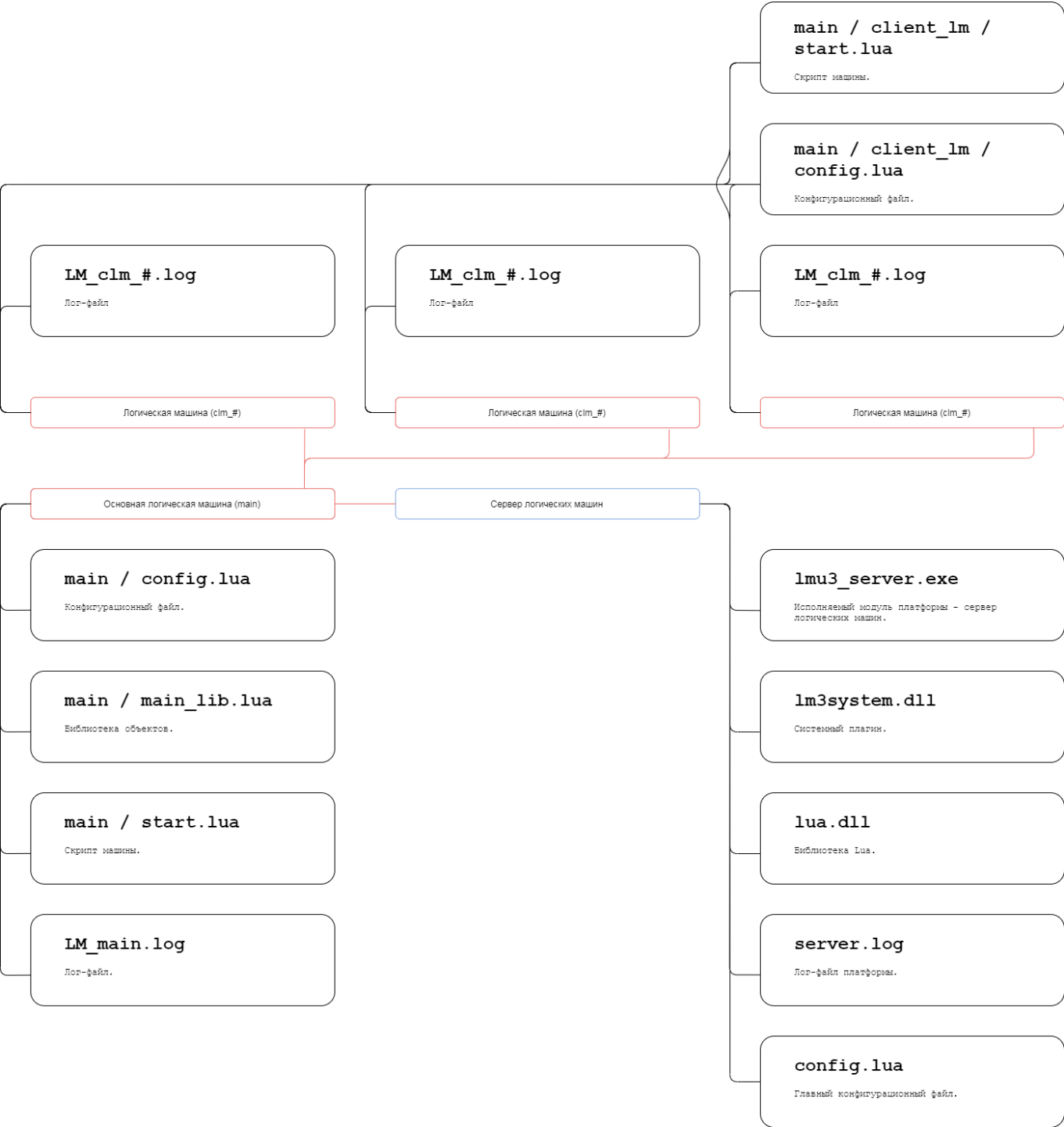
Запрос:

```
{ Command = "DoSendAll", Data = <string> }
```

Ответ (всем пользователям):

```
{ Command = "OnSendAll", Data = "Member: "..<string> }
```

Файловая структура проекта

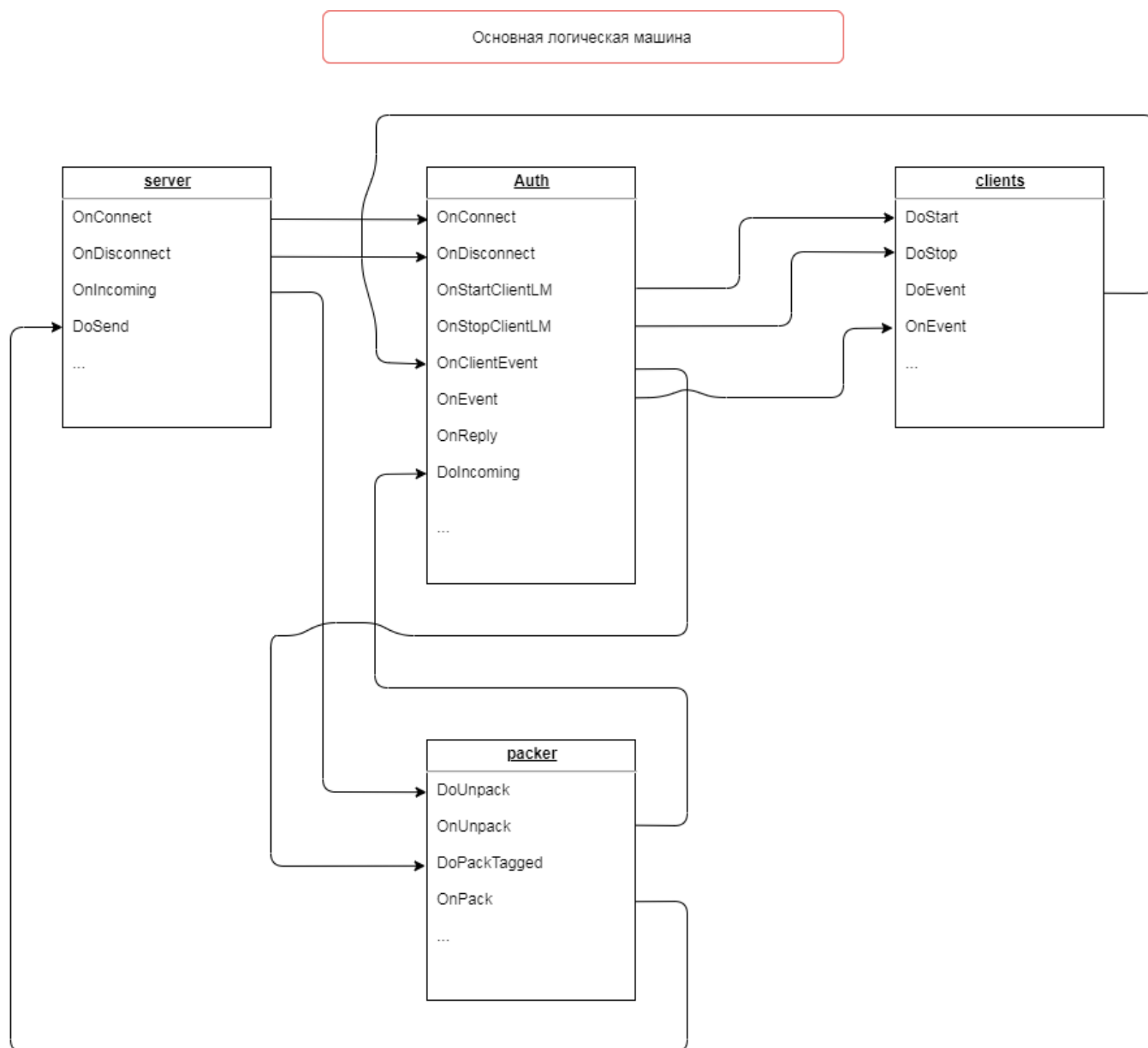


Взаимосвязи

Объекты основной логической машины:

- TCP-server server: прием и передача данных клиенту
- DataPack packer: распаковка и упаковка данных клиенту
- Auth: авторизация клиента; вызов создания ЛМ; связь клиента с соответствующей ЛМ
- Clients (наследник LMList): управление ЛМ

Диаграмма связей:



На логических машинах запросы обрабатываются следующим образом:

- команда авторизации DoAuthByName присваивает переменной userName значение и вызывает OnSendAll
- команда сообщения DoSend вызывает OnSendAll, если пользователь авторизован

Скрипты

main / start.lua

```
lm3:Log("Starting server")

lm3:LoadLibrary( {Alias = "sys", FileName = "lm3system"} )
lm3:Include("main_lib.lua")

lm3:CreateLObject( { LibAlias = "sys", Type = "TCPServer", Name = "server" } )
server:SetAttr("SocCount", lmconf.MaxClientCount)

lm3:CreateLObject( { LibAlias = "sys", Type = "DataPack", Name = "packer" } )
packer:SetAttr("BufCount", lmconf.MaxClientCount)

lm3:CreateObject( { Type = "LMList", Name = "clients" } )

init_Auth("Auth")

lm3:AddHandler("OnStart", function(o, ev)
    -- проверка конфигурации ЛМ
    if clients:DoPrepare(lmconf.BasePath.."client_lm/config.lua") == false
then
    lm3:Log("client_lm prepare failed")
end
end)

Auth:AddHandler("OnReply", function(o, ev)
    lm3:Log("Auth: OnReply: tag: "..tostring(ev.Tag)..":
"..lm3:DataToString(ev.Data))
end)

-- СВЯЗИ ОБЪЕКТОВ
server:Connect("OnConnect", "Auth", "DoConnect")
server:Connect("OnDisconnect", "Auth", "DoDisconnect")
server:Connect("OnIncoming", "packer", "DoUnpack")
packer:Connect("OnPack", "server", "DoSend")

packer:Connect("OnUnpack", "Auth", "DoIncoming")
Auth:Connect("OnReply", "packer", "DoPackTagged")

Auth:Connect("OnStartClientLM", "clients", "DoStart")
Auth:Connect("OnStopClientLM", "clients", "DoStop")
Auth:Connect("OnClientEvent", "clients", "DoEvent")
clients:Connect("OnEvent", "Auth", "DoClientEvent")
```

main / main_lib.lua

```
-- объект Auth
--
function init_Auth(_name)
    local obj = lm3:CreateObject( { Type = "Base", Name = _name } )

    obj.ClientList = {}
    for i = 1, lmconf.MaxClientCount do
        obj.ClientList[i] = {
            isConnected = false,
            LMName = "",
        }
    end

    function obj.TagFromLMName(_name)
        return tonumber(_name:sub(5))
    end

    -- подключение нового клиента
    -- старт ЛМ
    obj:AddInEvent("DoConnect", "int", function(o, ev)
        lm3:Log("New client connected: "..tostring(ev))
        obj.ClientList[ev].isConnected = true
        obj.ClientList[ev].LMName = "clm_"..tostring(ev)
        lm3:Log("Start client LM:")
        if obj:OnStartClientLM( { Name = obj.ClientList[ev].LMName } ) ==
true then
            lm3:Log("Start client LM complete.")
        else
            lm3:Log("ERROR: Start client LM failed.")
            obj.ClientList[ev].isConnected = false
        end
    end)

    -- отключение клиента
    -- остановка ЛМ
    obj:AddInEvent("DoDisconnect", "int", function(o, ev)
        lm3:Log("Client disconnected: "..tostring(ev))
        obj:OnStopClientLM(obj.ClientList[ev].LMName)
        obj.ClientList[ev].isConnected = false
    end)

    -- распределение данных от клиента
    obj:AddInEvent("DoIncoming",
"table[Tag:int,Data:table[Command:string,Data:string]]", function(o, ev)
        if obj.ClientList[ev.Tag].isConnected ~= true then
            lm3:Log("ERROR: Incoming data from not connected client:
"..tostring(ev.Tag))
        else
            lm3:Log("Incoming data from client with tag:
"..tostring(ev.Tag)..": "..lm3:DataToString(ev.Data))
            obj:OnClientEvent({ LMName = obj.ClientList[ev.Tag].LMName,
```

```

EventName = "OnExtEvent", Data = ev.Data })
    end
end)

-- обработка данных от ЛМ
obj:AddInEvent("DoClientEvent",
"table[LMName:string,EventName:string,Data:table[Command:string,Data:string]]", function(o, ev)
    if ev.Data.Command == "OnSendAll" then
        for i = 1, lmconf.MaxClientCount do
            if obj.ClientList[i].isConnected then
                obj:OnReply( { Tag = i, Data = ev.Data } )
            end
        end
    else
        local iClient = obj.TagFromLMName(ev.LMName)
        obj:OnReply( { Tag = iClient, Data = ev.Data } )
    end
end)

-- отправить данные клиенту
obj:AddOutEvent("OnReply",
"table[Tag:int,Data:table[Command:string,Data:string]]")

-- отправить данные в ЛМ
obj:AddOutProc("OnClientEvent",
"table[LMName:string,EventName:string,Data:any]", "bool")

obj:AddOutProc("OnStartClientLM", "table[Name:string]", "bool")

obj:AddOutProc("OnStopClientLM", "string", "bool")

return obj
end

```

main / client_lm / start.lua

```

lm3:LoadLibrary( {Alias = "sys", FileName = "lm3system"} )

-- объект Timer для alive сообщение
lm3:CreateObject( { Type = "Timer", Name = "timer" } )
timer:SetAttr("Interval", 30*1000)

lm3:AddHandler("OnStart", function(o, ev)
    timer:DoEnable(true)
end)

userName = nil

-- обработчик ивента с основной логической машины
lm3:AddHandler("OnExtEvent", function(o, ev)

```

```
    if ev.Command == "DoAuthByName" then
        userName = ev.Data
        lm3:DoExtEvent( { Command = "OnSendAll", Data = "Member connected:
"..userName } )
    elseif ev.Command == "DoSendAll" then
        if userName == nil then
            lm3:Log("Error: userName == nil")
        else
            lm3:DoExtEvent( { Command = "OnSendAll", Data = "Member
"..userName..": "..ev.Data } )
        end
    end
end
end)

timer:AddHandler("OnTick", function(o, ev)
    --lm3:Log("OnTick: send Alive")
    lm3:DoExtEvent( { Command = "Alive", Data = "" } )
end)
```

Логи

[client 1]

```
-- получение уникального имени
2020-11-27 19:02:14.044 1940-1940/com.example.lm3_client D/lm3: application:
onCreate: uniqueName: 3360d
2020-11-27 19:02:14.060 1940-1984/com.example.lm3_client D/lm3: application:
setNetworkStatus: 2
-- подключение к серверу
2020-11-27 19:02:14.060 1940-1984/com.example.lm3_client D/lm3: connect:
startServerConnection
2020-11-27 19:02:14.061 1940-1985/com.example.lm3_client D/lm3: connect:
start
2020-11-27 19:02:14.084 1940-1940/com.example.lm3_client
D/lm3: activity: main: onCreate
2020-11-27 19:02:14.188 1940-1985/com.example.lm3_client D/lm3: connect:
setServerConnection: true
2020-11-27 19:02:14.189 1940-1985/com.example.lm3_client D/lm3: connect:
done
2020-11-27 19:02:14.189 1940-1985/com.example.lm3_client D/lm3: connect: end
2020-11-27 19:02:14.189 1940-2027/com.example.lm3_client D/lm3: connect:
start listen
2020-11-27 19:02:14.234 1940-1940/com.example.lm3_client
D/lm3: activity: main: onResume
-- авторизация
2020-11-27 19:02:15.189 1940-2027/com.example.lm3_client D/lm3: listen:
DoAuthByName: 3360d
2020-11-27 19:02:15.190 1940-2027/com.example.lm3_client D/lm3: listen:
serverSend
2020-11-27 19:02:15.252 1940-2027/com.example.lm3_client D/lm3: listen:
```

```
OnSendAll: Member connected: 3360d
2020-11-27 19:02:24.392 1940-1940/com.example.lm3_client
D/lm3: activity: main:
-- отправка сообщения
button onClick: message: Hello
2020-11-27 19:02:24.392 1940-1940/com.example.lm3_client D/lm3: listen:
DoSendAll: Hello
2020-11-27 19:02:24.392 1940-1940/com.example.lm3_client D/lm3: listen:
serverSend
2020-11-27 19:02:24.424 1940-2027/com.example.lm3_client D/lm3: listen:
OnSendAll: Member 3360d: Hello
2020-11-27 19:02:34.153 1940-2027/com.example.lm3_client D/lm3: listen:
OnSendAll: Member 65c8c: Hi
```

[client 2]

```
-- получение уникального имени
2020-11-27 19:01:55.396 14523-14523/com.example.lm3_client
D/lm3: application: onCreate: uniqueName: 65c8c
2020-11-27 19:01:55.527 14523-14556/com.example.lm3_client
D/lm3: application: setNetworkStatus: 2
-- подключение к серверу
2020-11-27 19:01:55.527 14523-14556/com.example.lm3_client D/lm3: connect:
startServerConnection
2020-11-27 19:01:55.529 14523-14557/com.example.lm3_client D/lm3: connect:
start
2020-11-27 19:01:55.544 14523-14557/com.example.lm3_client D/lm3: connect:
setServerConnection: true
2020-11-27 19:01:55.545 14523-14557/com.example.lm3_client D/lm3: connect:
done
2020-11-27 19:01:55.545 14523-14557/com.example.lm3_client D/lm3: connect:
end
2020-11-27 19:01:55.545 14523-14559/com.example.lm3_client D/lm3: connect:
start listen
2020-11-27 19:01:55.573 14523-14523/com.example.lm3_client
D/lm3: activity: main: onCreate
2020-11-27 19:01:55.716 14523-14523/com.example.lm3_client
D/lm3: activity: main: onResume
-- авторизация
2020-11-27 19:01:56.546 14523-14559/com.example.lm3_client D/lm3: listen:
DoAuthByName: 65c8c
2020-11-27 19:01:56.546 14523-14559/com.example.lm3_client D/lm3: listen:
serverSend
2020-11-27 19:01:56.580 14523-14559/com.example.lm3_client D/lm3: listen:
OnSendAll: Member connected: 65c8c
2020-11-27 19:02:14.398 14523-14559/com.example.lm3_client D/lm3: listen:
OnSendAll: Member connected: 3360d
2020-11-27 19:02:23.602 14523-14559/com.example.lm3_client D/lm3: listen:
OnSendAll: Member 3360d: Hello
-- отправка сообщения
2020-11-27 19:02:33.103 14523-14523/com.example.lm3_client
```

```
D/lm3: activity: main: button onClick: message: Hi
2020-11-27 19:02:33.103 14523-14523/com.example.lm3_client D/lm3: listen:
DoSendAll: Hi
2020-11-27 19:02:33.103 14523-14523/com.example.lm3_client D/lm3: listen:
serverSend
2020-11-27 19:02:33.139 14523-14559/com.example.lm3_client D/lm3: listen:
OnSendAll: Member 65c8c: Hi
```

[server] LM_main.log

```
[2020-11-27 19:01:30][INFO:LMInit][Start logic machine v3.3(Build:555) -----
-----]
[2020-11-27 19:01:30][LUA:LMCore][Starting server]
[2020-11-27 19:01:30][TRACE:LMInit][Create library object: server]
[2020-11-27 19:01:30][TRACE:LMInit][Create library object: packer]
[2020-11-27 19:01:30][TRACE:LMInit][Create object: clients]
[2020-11-27 19:01:30][TRACE:LMInit][Create object: Auth]
[2020-11-27 19:01:30][INFO:LMInit][Initialization complete.]
[2020-11-27 19:01:48][LUA:LMCore][New client connected: 1]
[2020-11-27 19:01:48][LUA:LMCore][Start client LM:]
[2020-11-27 19:01:48][LUA:LMCore][Start client LM complete.]
-- авторизация первого клиента
[2020-11-27 19:01:49][LUA:LMCore][Incoming data from client with tag: 1 :
[Table:2]
  "Command" = [String] "DoAuthByName"
  "Data" = [String] "65c8c"]
[2020-11-27 19:01:49][LUA:LMCore][Auth: OnReply: tag: 1 : [Table:2]
  "Command" = [String] "OnSendAll"
  "Data" = [String] "Member connected: 65c8c"]
[2020-11-27 19:02:06][LUA:LMCore][New client connected: 2]
[2020-11-27 19:02:06][LUA:LMCore][Start client LM:]
[2020-11-27 19:02:06][LUA:LMCore][Start client LM complete.]
-- авторизация второго клиента
[2020-11-27 19:02:07][LUA:LMCore][Incoming data from client with tag: 2 :
[Table:2]
  "Command" = [String] "DoAuthByName"
  "Data" = [String] "3360d"]
[2020-11-27 19:02:07][LUA:LMCore][Auth: OnReply: tag: 1 : [Table:2]
  "Command" = [String] "OnSendAll"
  "Data" = [String] "Member connected: 3360d"]
[2020-11-27 19:02:07][LUA:LMCore][Auth: OnReply: tag: 2 : [Table:2]
  "Command" = [String] "OnSendAll"
  "Data" = [String] "Member connected: 3360d"]
-- сообщение от первого клиента
[2020-11-27 19:02:16][LUA:LMCore][Incoming data from client with tag: 2 :
[Table:2]
  "Command" = [String] "DoSendAll"
  "Data" = [String] "Hello"]
[2020-11-27 19:02:16][LUA:LMCore][Auth: OnReply: tag: 1 : [Table:2]
  "Command" = [String] "OnSendAll"
  "Data" = [String] "Member 3360d: Hello"]
```

```
[2020-11-27 19:02:16][LUA:LMCore][Auth: OnReply: tag: 2 : [Table:2]
  "Command" = [String] "OnSendAll"
  "Data" = [String] "Member 3360d: Hello"
[2020-11-27 19:02:18][LUA:LMCore][Auth: OnReply: tag: 1 : [Table:2]
  "Command" = [String] "Alive"
  "Data" = [String] ""
-- сообщение от второго клиента
[2020-11-27 19:02:26][LUA:LMCore][Incoming data from client with tag: 1 :
[Table:2]
  "Command" = [String] "DoSendAll"
  "Data" = [String] "Hi"]
[2020-11-27 19:02:26][LUA:LMCore][Auth: OnReply: tag: 1 : [Table:2]
  "Command" = [String] "OnSendAll"
  "Data" = [String] "Member 65c8c: Hi"]
[2020-11-27 19:02:26][LUA:LMCore][Auth: OnReply: tag: 2 : [Table:2]
  "Command" = [String] "OnSendAll"
  "Data" = [String] "Member 65c8c: Hi"]
[2020-11-27 19:02:36][LUA:LMCore][Auth: OnReply: tag: 2 : [Table:2]
  "Command" = [String] "Alive"
  "Data" = [String] ""
[2020-11-27 19:02:48][LUA:LMCore][Auth: OnReply: tag: 1 : [Table:2]
  "Command" = [String] "Alive"
  "Data" = [String] ""
[2020-11-27 19:03:06][INFO:LMCore][Stop logic machine.]
```

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