ET 框架学习笔记（二） - - 网络交互相关

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Contents

1 Actor 消息相关

1.1 ActorMessageSender: 知道对方的 instanceId，使用这个类发 actor 消息

```
public readonly struct ActorMessageSender {
    public long ActorId { get; }
    public long CreateTime { get; } // 最近接收或者发送消息的时间
    public IActorRequest Request { get; }
    public bool NeedException { get; }
    public ETTask<IActorResponse> Tcs { get; }
    public ActorMessageSender(long actorId, IActorRequest iActorRequest, ETTask<IActorResponse> tcs, bool needException) {
    }
}
```

1.2 ActorMessageSenderComponent:

```
[ComponentOf(typeof(Scene))]
public class ActorMessageSenderComponent: Entity, IAwake, IDestroy {
    public const long TIMEOUT_TIME = 40 * 1000;
    public static ActorMessageSenderComponent Instance { get; set; }
```

```
    public int RpcId;
    public readonly SortedDictionary<int, ActorMessageSender> requestCallback = new SortedDictionary<int, ActorMessageSende
    public long TimeoutCheckTimer;
    public List<int> TimeoutActorMessageSenders = new List<int>();
}
```

1.3 ActorMessageSenderComponentSystem: 这个类，今天晚上没有看懂，明天上午再看一下

```
[FriendOf(typeof(ActorMessageSenderComponent))]
public static class ActorMessageSenderComponentSystem {
    [Invoke(TimerInvokeType.ActorMessageSenderChecker)] // 另一个新标签，激活系
    public class ActorMessageSenderChecker: ATimer<ActorMessageSenderComponent> {
        protected override void Run(ActorMessageSenderComponent self) {
            try {
                self.Check();
            }
            catch (Exception e) {
                Log.Error($"move timer error: {self.Id}\n{e}");
            }
        }
    }
    // [ObjectSystem] // Awake() etc
    private static void Run(ActorMessageSender self, IActorResponse response) {
        if (response.Error == ErrorCore.ERR_ActorTimeout) {
            self.Tcs.SetException(new Exception($"Rpc error: request, 注意 Actor 消息超时，请注意查看是否死锁或者没有 reply: a
            return;
        }
        if (self.NeedException && ErrorCore.IsRpcNeedThrowException(response.Error)) {
            self.Tcs.SetException(new Exception($"Rpc error: actorId: {self.ActorId} request: {self.Request}, response: {re
            return;
        }
        self.Tcs.SetResult(response);
    }
    private static void Check(this ActorMessageSenderComponent self) {
        long timeNow = TimeHelper.ServerNow();
        foreach ((int key, ActorMessageSender value) in self.requestCallback) {
            // 因为是顺序发送的，所以，检测到第一个不超时的就退出
            if (timeNow < value.CreateTime + ActorMessageSenderComponent.TIMEOUT_TIME)
                break;
            self.TimeoutActorMessageSenders.Add(key);
        }
        foreach (int rpcId in self.TimeoutActorMessageSenders) {
            ActorMessageSender actorMessageSender = self.requestCallback[rpcId];
            self.requestCallback.Remove(rpcId);
            try {
                IActorResponse response = ActorHelper.CreateResponse(actorMessageSender.Request, ErrorCore.ERR_ActorTimeout
                Run(actorMessageSender, response);
            }
            catch (Exception e) {
                Log.Error(e.ToString());
            }
        }
        self.TimeoutActorMessageSenders.Clear();
    }
    public static void Send(this ActorMessageSenderComponent self, long actorId, IMessage message) {
        if (actorId == 0) {
            throw new Exception($"actor id is 0: {message}");
        }
        ProcessActorId processActorId = new(actorId);
        // 这里做了优化，如果发向同一个进程，则直接处理，不需要通过网络层
        if (processActorId.Process == Options.Instance.Process) {
            NetInnerComponent.Instance.HandleMessage(actorId, message);
            return;
        }
        Session session = NetInnerComponent.Instance.Get(processActorId.Process);
        session.Send(processActorId.ActorId, message);
    }
    public static int GetRpcId(this ActorMessageSenderComponent self) {
        return ++self.RpcId;
    }
    public static async ETTask<IActorResponse> Call(
        this ActorMessageSenderComponent self,
```

```
        long actorId,
        IActorRequest request,
        bool needException = true
        ) {
        request.RpcId = self.GetRpcId();
        if (actorId == 0) {
            throw new Exception($"actor id is 0: {request}");
        }
        return await self.Call(actorId, request.RpcId, request, needException);
    }
    public static async ETTask<IActorResponse> Call(
        this ActorMessageSenderComponent self,
        long actorId,
        int rpcId,
        IActorRequest iActorRequest,
        bool needException = true
        ) {
        if (actorId == 0) {
            throw new Exception($"actor id is 0: {iActorRequest}");
        }
        var tcs = ETTask<IActorResponse>.Create(true);
        self.requestCallback.Add(rpcId, new ActorMessageSender(actorId, iActorRequest, tcs, needException));
        self.Send(actorId, iActorRequest);
        long beginTime = TimeHelper.ServerFrameTime();
        IActorResponse response = await tcs;
        long endTime = TimeHelper.ServerFrameTime();
        long costTime = endTime - beginTime;
        if (costTime > 200) {
            Log.Warning($"actor rpc time > 200: {costTime} {iActorRequest}");
        }
        return response;
    }
    public static void HandleIActorResponse(this ActorMessageSenderComponent self, IActorResponse response) {
        ActorMessageSender actorMessageSender;
        if (!self.requestCallback.TryGetValue(response.RpcId, out actorMessageSender)) {
            return;
        }
        self.requestCallback.Remove(response.RpcId);
        Run(actorMessageSender, response);
    }
}
```

1.4 LocationProxyComponent

```
[ComponentOf(typeof(Scene))]
public class LocationProxyComponent: Entity, IAwake, IDestroy {
    [StaticField]
    public static LocationProxyComponent Instance;
}
```

1.5 LocationProxyComponentSystem

```
// [ObjectSystem] awake() etc
public static class LocationProxyComponentSystem {
    private static long GetLocationSceneId(long key) {
        return StartSceneConfigCategory.Instance.LocationConfig.InstanceId;
    }
    public static async ETTask Add(this LocationProxyComponent self, long key, long instanceId) {
        await ActorMessageSenderComponent.Instance
            .Call(GetLocationSceneId(key),
                  new ObjectAddRequest() { Key = key, InstanceId = instanceId });
    }
    public static async ETTask Lock(this LocationProxyComponent self, long key, long instanceId, int time = 60000) {
        await ActorMessageSenderComponent.Instance
            .Call(GetLocationSceneId(key),
                  new ObjectLockRequest() { Key = key, InstanceId = instanceId, Time = time });
    }
    public static async ETTask UnLock(this LocationProxyComponent self, long key, long oldInstanceId, long instanceId) {
        await ActorMessageSenderComponent.Instance
            .Call(GetLocationSceneId(key),
                  new ObjectUnLockRequest() { Key = key, OldInstanceId = oldInstanceId, InstanceId = instanceId });
    }
```

```
    public static async ETTask Remove(this LocationProxyComponent self, long key) {
        await ActorMessageSenderComponent.Instance
            .Call(GetLocationSceneId(key),
                  new ObjectRemoveRequest() { Key = key });
    }
    public static async ETTask<long> Get(this LocationProxyComponent self, long key) {
        if (key == 0)
            throw new Exception($"get location key 0");
        // location server 配置到共享区，一个大战区可以配置 N 多个 location server，这里暂时为 1
        ObjectGetResponse response = (ObjectGetResponse) await ActorMessageSenderComponent.Instance
            .Call(GetLocationSceneId(key),
                new ObjectGetRequest() { Key = key });
        return response.InstanceId;
    }
    public static async ETTask AddLocation(this Entity self) {
        await LocationProxyComponent.Instance.Add(self.Id, self.InstanceId);
    }
    public static async ETTask RemoveLocation(this Entity self) {
        await LocationProxyComponent.Instance.Remove(self.Id);
    }
}
```

1.6 ActorLocationSender: 知道对方的 Id，使用这个类发 actor 消息

```
[ChildOf(typeof(ActorLocationSenderComponent))]
public class ActorLocationSender: Entity, IAwake, IDestroy {
    public long ActorId;
    public long LastSendOrRecvTime; // 最近接收或者发送消息的时间
    public int Error;
}
```

1.7 ActorLocationSenderComponent: 位置发送组件

```
 [ComponentOf(typeof(Scene))]
 public class ActorLocationSenderComponent: Entity, IAwake, IDestroy {
     public const long TIMEOUT_TIME = 60 * 1000;
     public static ActorLocationSenderComponent Instance { get; set; }
     public long CheckTimer;
 }
```

1.8 ActorLocationSenderComponentSystem: 这个类，也要明天上午再看一下

```
[Invoke(TimerInvokeType.ActorLocationSenderChecker)]
public class ActorLocationSenderChecker: ATimer<ActorLocationSenderComponent> {
    protected override void Run(ActorLocationSenderComponent self) {
        try {
            self.Check();
        }
        catch (Exception e) {
            Log.Error($"move timer error: {self.Id}\n{e}");
        }
    }
}
// [ObjectSystem] // ...
[FriendOf(typeof(ActorLocationSenderComponent))]
[FriendOf(typeof(ActorLocationSender))]
public static class ActorLocationSenderComponentSystem {
    public static void Check(this ActorLocationSenderComponent self) {
        using (ListComponent<long> list = ListComponent<long>.Create()) {
            long timeNow = TimeHelper.ServerNow();
            foreach ((long key, Entity value) in self.Children) {
                ActorLocationSender actorLocationMessageSender = (ActorLocationSender) value;
                if (timeNow > actorLocationMessageSender.LastSendOrRecvTime + ActorLocationSenderComponent.TIMEOUT_TIME)
                    list.Add(key);
            }
            foreach (long id in list) {
                self.Remove(id);
            }
        }
```

```
}
private static ActorLocationSender GetOrCreate(this ActorLocationSenderComponent self, long id) {
    if (id == 0)
        throw new Exception($"actor id is 0");
    if (self.Children.TryGetValue(id, out Entity actorLocationSender)) {
        return (ActorLocationSender) actorLocationSender;
    }
    actorLocationSender = self.AddChildWithId<ActorLocationSender>(id);
    return (ActorLocationSender) actorLocationSender;
}
private static void Remove(this ActorLocationSenderComponent self, long id) {
    if (!self.Children.TryGetValue(id, out Entity actorMessageSender))
        return;
    actorMessageSender.Dispose();
}
public static void Send(this ActorLocationSenderComponent self, long entityId, IActorRequest message) {
    self.Call(entityId, message).Coroutine();
}
public static async ETTask<IActorResponse> Call(this ActorLocationSenderComponent self, long entityId, IActorRequest iA
    ActorLocationSender actorLocationSender = self.GetOrCreate(entityId);
    // 先序列化好
    int rpcId = ActorMessageSenderComponent.Instance.GetRpcId();
    iActorRequest.RpcId = rpcId;
    long actorLocationSenderInstanceId = actorLocationSender.InstanceId;
    using (await CoroutineLockComponent.Instance.Wait(CoroutineLockType.ActorLocationSender, entityId)) {
        if (actorLocationSender.InstanceId != actorLocationSenderInstanceId)
            throw new RpcException(ErrorCore.ERR_ActorTimeout, $"{iActorRequest}");
        // 队列中没处理的消息返回跟上个消息一样的报错
        if (actorLocationSender.Error == ErrorCore.ERR_NotFoundActor)
            return ActorHelper.CreateResponse(iActorRequest, actorLocationSender.Error);
        try {
            return await self.CallInner(actorLocationSender, rpcId, iActorRequest);
        }
        catch (RpcException) {
            self.Remove(actorLocationSender.Id);
            throw;
        }
        catch (Exception e) {
            self.Remove(actorLocationSender.Id);
            throw new Exception($"{iActorRequest}", e);
        }
    }
}
private static async ETTask<IActorResponse> CallInner(this ActorLocationSenderComponent self, ActorLocationSender actor
    int failTimes = 0;
    long instanceId = actorLocationSender.InstanceId;
    actorLocationSender.LastSendOrRecvTime = TimeHelper.ServerNow();
    while (true) {
        if (actorLocationSender.ActorId == 0) {
            actorLocationSender.ActorId = await LocationProxyComponent.Instance.Get(actorLocationSender.Id);
            if (actorLocationSender.InstanceId != instanceId)
                throw new RpcException(ErrorCore.ERR_ActorLocationSenderTimeout2, $"{iActorRequest}");
        }
        if (actorLocationSender.ActorId == 0) {
            actorLocationSender.Error = ErrorCore.ERR_NotFoundActor;
            return ActorHelper.CreateResponse(iActorRequest, ErrorCore.ERR_NotFoundActor);
        }
        IActorResponse response = await ActorMessageSenderComponent.Instance.Call(actorLocationSender.ActorId, rpcId, i
        if (actorLocationSender.InstanceId != instanceId)
            throw new RpcException(ErrorCore.ERR_ActorLocationSenderTimeout3, $"{iActorRequest}");
        switch (response.Error) {
            case ErrorCore.ERR_NotFoundActor: {
                // 如果没找到 Actor, 重试
                ++failTimes;
                if (failTimes > 20) {
                    Log.Debug($"actor send message fail, actorid: {actorLocationSender.Id}");
                    actorLocationSender.Error = ErrorCore.ERR_NotFoundActor;
                    // 这里不能删除 actor, 要让后面等待发送的消息也返回 ERR_NotFoundActor, 直到超时删除
                    return response;
                }
                // 等待 0.5s 再发送
                await TimerComponent.Instance.WaitAsync(500);
                if (actorLocationSender.InstanceId != instanceId)
                    throw new RpcException(ErrorCore.ERR_ActorLocationSenderTimeout4, $"{iActorRequest}");
                actorLocationSender.ActorId = 0;
```

```
                    continue;
                }
                case ErrorCore.ERR_ActorTimeout:
                    throw new RpcException(response.Error, $"{iActorRequest}");
            }
            if (ErrorCore.IsRpcNeedThrowException(response.Error)) {
                throw new RpcException(response.Error, $"Message: {response.Message} Request: {iActorRequest}");
            }
            return response;
        }
    }
}
```

1.9 ActorHelper: 帮助创建 IActorResponse 回复消息。狠简单

```
public static class ActorHelper {
    public static IActorResponse CreateResponse(IActorRequest iActorRequest, int error) {
        Type responseType = OpcodeTypeComponent.Instance.GetResponseType(iActorRequest.GetType());
        IActorResponse response = (IActorResponse)Activator.CreateInstance(responseType);
        response.Error = error;
        response.RpcId = iActorRequest.RpcId;
        return response;
    }
}
```

1.10 ActorMessageDispatcherInfo | ActorMessageDispatcherComponent

```
public class ActorMessageDispatcherInfo {
    public SceneType SceneType { get; }
    public IMActorHandler IMActorHandler { get; }
    public ActorMessageDispatcherInfo(SceneType sceneType, IMActorHandler imActorHandler) {
        this.SceneType = sceneType;
        this.IMActorHandler = imActorHandler;
    }
}
[ComponentOf(typeof(Scene))] // Actor 消息分发组件
public class ActorMessageDispatcherComponent: Entity, IAwake, IDestroy, ILoad {
    [StaticField]
    public static ActorMessageDispatcherComponent Instance;
    public readonly Dictionary<Type, List<ActorMessageDispatcherInfo>> ActorMessageHandlers = new();
}
```

1.11 ActorMessageDispatcherComponentHelper: 感觉名字不系统化，不知道是不是自己干的

```
[FriendOf(typeof(ActorMessageDispatcherComponent))] // Actor 消息分发组件
public static class ActorMessageDispatcherComponentHelper {
    // [ObjectSystem] // awake() etc
    private static void Awake(this ActorMessageDispatcherComponent self) {
        self.Load();
    }
    private static void Load(this ActorMessageDispatcherComponent self) {
        self.ActorMessageHandlers.Clear();
        var types = EventSystem.Instance.GetTypes(typeof (ActorMessageHandlerAttribute));
        foreach (Type type in types) {
            object obj = Activator.CreateInstance(type);
            IMActorHandler imHandler = obj as IMActorHandler;
            if (imHandler == null) {
                throw new Exception($"message handler not inherit IMActorHandler abstract class: {obj.GetType().FullName}")
            }

            object[] attrs = type.GetCustomAttributes(typeof(ActorMessageHandlerAttribute), false);
            foreach (object attr in attrs) {
                ActorMessageHandlerAttribute actorMessageHandlerAttribute = attr as ActorMessageHandlerAttribute;
                Type messageType = imHandler.GetRequestType();
                Type handleResponseType = imHandler.GetResponseType();
                if (handleResponseType != null) {
                    Type responseType = OpcodeTypeComponent.Instance.GetResponseType(messageType);
                    if (handleResponseType != responseType) {
                        throw new Exception($"message handler response type error: {messageType.FullName}");
```

```
                }
            }
            ActorMessageDispatcherInfo actorMessageDispatcherInfo = new(actorMessageHandlerAttribute.SceneType, imHandl
            self.RegisterHandler(messageType, actorMessageDispatcherInfo);
        }
    }
}
private static void RegisterHandler(this ActorMessageDispatcherComponent self, Type type, ActorMessageDispatcherInfo ha
    if (!self.ActorMessageHandlers.ContainsKey(type))
        self.ActorMessageHandlers.Add(type, new List<ActorMessageDispatcherInfo>());
    self.ActorMessageHandlers[type].Add(handler);
}
public static async ETTask Handle(this ActorMessageDispatcherComponent self, Entity entity, int fromProcess, object mes
    List<ActorMessageDispatcherInfo> list;
    if (!self.ActorMessageHandlers.TryGetValue(message.GetType(), out list))
        throw new Exception($"not found message handler: {message}");
    SceneType sceneType = entity.DomainScene().SceneType;
    foreach (ActorMessageDispatcherInfo actorMessageDispatcherInfo in list) {
        if (actorMessageDispatcherInfo.SceneType != sceneType)
            continue;
        await actorMessageDispatcherInfo.IMActorHandler.Handle(entity, fromProcess, message);
    }
}
}
```

1.12 ActorMessageHandlerAttribute 标签系: 去找几个典型标签看看

```
public class ActorMessageHandlerAttribute: BaseAttribute {
    public SceneType SceneType { get; }
    public ActorMessageHandlerAttribute(SceneType sceneType) {
        this.SceneType = sceneType;
    }
}
```

1.13 [ActorMessageHandler(SceneType.Gate)] 标签使用举例

- 是以前框架中或是参考项目中的例子。标签使用申明说，这是【网关服】上的一个 Actor 消息处理器定义类。

```
[ActorMessageHandler(SceneType.Gate)]
public class Actor_MatchSucess_NttHandler : AMActorHandler<User, Actor_MatchSucess_Ntt> {
    protected override void Run(User user, Actor_MatchSucess_Ntt message) {
        user.IsMatching = false;
        user.ActorID = message.GamerID;
        Log.Info($" 玩家 {user.UserID} 匹配成功");
    }
}
```

1.14 MailBoxComponent: 挂上这个组件表示该 Entity 是一个 Actor, 接收的消息将会队列处理

```
// 挂上这个组件表示该 Entity 是一个 Actor, 接收的消息将会队列处理
[ComponentOf]
public class MailBoxComponent: Entity, IAwake, IAwake<MailboxType> {
    // Mailbox 的类型
    public MailboxType MailboxType { get; set; }
}
```

1.15 MailboxType

```
public enum MailboxType {
    MessageDispatcher, // 消息分发器
    UnOrderMessageDispatcher,// 无序分发
    GateSession,// 网关？
}
```

1.16 【服务端】ActorHandleHelper 帮助类。【需要去深挖一下】

```
public static class ActorHandleHelper {
    public static void Reply(int fromProcess, IActorResponse response) {
        if (fromProcess == Options.Instance.Process) { // 返回消息是同一个进程
            // NetInnerComponent.Instance.HandleMessage(realActorId, response); // 等同于直接调用下面这句【我自己暂时放回来的】
            ActorMessageSenderComponent.Instance.HandleIActorResponse(response);
            return;
        }
        Session replySession = NetInnerComponent.Instance.Get(fromProcess);
        replySession.Send(response);
    }
    public static void HandleIActorResponse(IActorResponse response) {
        ActorMessageSenderComponent.Instance.HandleIActorResponse(response);
    }
    // 分发 actor 消息
    [EnableAccessEntiyChild]
    public static async ETTask HandleIActorRequest(long actorId, IActorRequest iActorRequest) {
        InstanceIdStruct instanceIdStruct = new(actorId);
        int fromProcess = instanceIdStruct.Process;
        instanceIdStruct.Process = Options.Instance.Process;
        long realActorId = instanceIdStruct.ToLong();
        Entity entity = Root.Instance.Get(realActorId);
        if (entity == null) {
            IActorResponse response = ActorHelper.CreateResponse(iActorRequest, ErrorCore.ERR_NotFoundActor);
            Reply(fromProcess, response);
            return;
        }
        MailBoxComponent mailBoxComponent = entity.GetComponent<MailBoxComponent>();
        if (mailBoxComponent == null) {
            Log.Warning($"actor not found mailbox: {entity.GetType().Name} {realActorId} {iActorRequest}");
            IActorResponse response = ActorHelper.CreateResponse(iActorRequest, ErrorCore.ERR_NotFoundActor);
            Reply(fromProcess, response);
            return;
        }
        switch (mailBoxComponent.MailboxType) {
            case MailboxType.MessageDispatcher: {
                using (await CoroutineLockComponent.Instance.Wait(CoroutineLockType.Mailbox, realActorId)) {
                    if (entity.InstanceId != realActorId) {
                        IActorResponse response = ActorHelper.CreateResponse(iActorRequest, ErrorCore.ERR_NotFoundActor);
                        Reply(fromProcess, response);
                        break;
                    }
                    await ActorMessageDispatcherComponent.Instance.Handle(entity, fromProcess, iActorRequest);
                }
                break;
            }
            case MailboxType.UnOrderMessageDispatcher: {
                await ActorMessageDispatcherComponent.Instance.Handle(entity, fromProcess, iActorRequest);
                break;
            }
            case MailboxType.GateSession:
            default:
                throw new Exception($"no mailboxtype: {mailBoxComponent.MailboxType} {iActorRequest}");
        }
    }
    // 分发 actor 消息
    [EnableAccessEntiyChild]
    public static async ETTask HandleIActorMessage(long actorId, IActorMessage iActorMessage) {
        InstanceIdStruct instanceIdStruct = new(actorId);
        int fromProcess = instanceIdStruct.Process;
        instanceIdStruct.Process = Options.Instance.Process;
        long realActorId = instanceIdStruct.ToLong();
        Entity entity = Root.Instance.Get(realActorId);
        if (entity == null) {
            Log.Error($"not found actor: {realActorId} {iActorMessage}");
            return;
        }
        MailBoxComponent mailBoxComponent = entity.GetComponent<MailBoxComponent>();
        if (mailBoxComponent == null) {
            Log.Error($"actor not found mailbox: {entity.GetType().Name} {realActorId} {iActorMessage}");
            return;
        }
        switch (mailBoxComponent.MailboxType) {
        case MailboxType.MessageDispatcher: {
```

```
            using (await CoroutineLockComponent.Instance.Wait(CoroutineLockType.Mailbox, realActorId)) {
                if (entity.InstanceId != realActorId) {
                    break;
                }
                await ActorMessageDispatcherComponent.Instance.Handle(entity, fromProcess, iActorMessage);
            }
            break;
        }
        case MailboxType.UnOrderMessageDispatcher: {
            await ActorMessageDispatcherComponent.Instance.Handle(entity, fromProcess, iActorMessage);
            break;
        }
        case MailboxType.GateSession: {
            if (entity is Session gateSession) {
                // 发送给客户端
                gateSession.Send(iActorMessage);
            }
            break;
        }
        default:
            throw new Exception($"no mailboxtype: {mailBoxComponent.MailboxType} {iActorMessage}");
        }
    }
}
```

2 StartConfigComponent: 找【各种服】的起始初始化地址

2.1 ConfigSingleton<T>: ProtoObject, ISingleton

```
public abstract class ConfigSingleton<T>: ProtoObject, ISingleton where T: ConfigSingleton<T>, new() {
        [StaticField]
        private static T instance;
        public static T Instance {
            get {
                return instance ??= ConfigComponent.Instance.LoadOneConfig(typeof (T)) as T;
            }
        }
        void ISingleton.Register() {
            if (instance != null) {
                throw new Exception($"singleton register twice! {typeof (T).Name}");
            }
            instance = (T)this;
        }
        void ISingleton.Destroy() {
            T t = instance;
            instance = null;
            t.Dispose();
        }
        bool ISingleton.IsDisposed() {
            throw new NotImplementedException();
        }
        public override void AfterEndInit() { }
        public virtual void Dispose() { }
    }
```

2.2 SceneFactory 里可以给【匹配服】添加组件

```
public static class SceneFactory {
    public static async ETTask<Scene> CreateServerScene(Entity parent, long id, long instanceId, int zone, string name, Sce
        await ETTask.CompletedTask;
        Scene scene = EntitySceneFactory.CreateScene(id, instanceId, zone, sceneType, name, parent);
        scene.AddComponent<MailBoxComponent, MailboxType>(MailboxType.UnOrderMessageDispatcher);
        switch (scene.SceneType) {
        case SceneType.Router:
            scene.AddComponent<RouterComponent, IPEndPoint, string>(startSceneConfig.OuterIPPort, startSceneConfig.StartPro
            break;
        case SceneType.RouterManager: // 正式发布请用 CDN 代替 RouterManager
            // 云服务器在防火墙那里做端口映射
            scene.AddComponent<HttpComponent, string>($"http:// *:{startSceneConfig.OuterPort}/");
            break;
```

```
            case SceneType.Realm:
                scene.AddComponent<NetServerComponent, IPEndPoint>(startSceneConfig.InnerIPOutPort);
                break;
            case SceneType.Match: // <<<<<<<<<<<<<<<<<<<< 这里是，我可以添加【匹配服】相关功能组件的地方。【参考项目原原码】感觉被我弄
                break;
            case SceneType.Gate:
                scene.AddComponent<NetServerComponent, IPEndPoint>(startSceneConfig.InnerIPOutPort);
                scene.AddComponent<PlayerComponent>();
                scene.AddComponent<GateSessionKeyComponent>();
                break;
            case SceneType.Map:
                scene.AddComponent<UnitComponent>();
                scene.AddComponent<AOIManagerComponent>();
                break;
            case SceneType.Location:
                scene.AddComponent<LocationComponent>();
                break;
//...
            }
            return scene;
        }
    }
```

2.3 RouterAddressComponent: 路由器组件

```
[ComponentOf(typeof(Scene))]
public class RouterAddressComponent: Entity, IAwake<string, int> {
    public IPAddress RouterManagerIPAddress { get; set; }
    public string RouterManagerHost;
    public int RouterManagerPort;
    public HttpGetRouterResponse Info;
    public int RouterIndex;
}
```

2.4 RouterAddressComponentSystem: 路由器的生成系

```
[FriendOf(typeof(RouterAddressComponent))]
public static class RouterAddressComponentSystem {
    public class RouterAddressComponentAwakeSystem: AwakeSystem<RouterAddressComponent, string, int> {
        protected override void Awake(RouterAddressComponent self, string address, int port) {
            self.RouterManagerHost = address;
            self.RouterManagerPort = port;
        }
    }
    public static async ETTask Init(this RouterAddressComponent self) {
        self.RouterManagerIPAddress = NetworkHelper.GetHostAddress(self.RouterManagerHost);
        await self.GetAllRouter();
    }
    private static async ETTask GetAllRouter(this RouterAddressComponent self) {
        string url = $"http:// {self.RouterManagerHost}:{self.RouterManagerPort}/get_router?v={RandomGenerator.RandUInt32()
        Log.Debug($"start get router info: {url}");
        string routerInfo = await HttpClientHelper.Get(url);
        Log.Debug($"recv router info: {routerInfo}");
        HttpGetRouterResponse httpGetRouterResponse = JsonHelper.FromJson<HttpGetRouterResponse>(routerInfo);
        self.Info = httpGetRouterResponse;
        Log.Debug($"start get router info finish: {JsonHelper.ToJson(httpGetRouterResponse)}");
        // 打乱顺序
        RandomGenerator.BreakRank(self.Info.Routers);
        self.WaitTenMinGetAllRouter().Coroutine();
    }
    // 等 10 分钟再获取一次
    public static async ETTask WaitTenMinGetAllRouter(this RouterAddressComponent self) {
        await TimerComponent.Instance.WaitAsync(5 * 60 * 1000);
        if (self.IsDisposed)
            return;
        await self.GetAllRouter();
    }
    public static IPEndPoint GetAddress(this RouterAddressComponent self) {
        if (self.Info.Routers.Count == 0)
            return null;
        string address = self.Info.Routers[self.RouterIndex++ % self.Info.Routers.Count];
        string[] ss = address.Split(':');
```

```
        IPAddress ipAddress = IPAddress.Parse(ss[0]);
        if (self.RouterManagerIPAddress.AddressFamily == AddressFamily.InterNetworkV6) {
            ipAddress = ipAddress.MapToIPv6();
        }
        return new IPEndPoint(ipAddress, int.Parse(ss[1]));
    }
    public static IPEndPoint GetRealmAddress(this RouterAddressComponent self, string account) { // <<<<<<<<<<<<<<<<<<< 照
        int v = account.Mode(self.Info.Realms.Count);
        string address = self.Info.Realms[v];
        string[] ss = address.Split(':');
        IPAddress ipAddress = IPAddress.Parse(ss[0]);
        // if (self.IPAddress.AddressFamily == AddressFamily.InterNetworkV6)
        //    ipAddress = ipAddress.MapToIPv6();
        return new IPEndPoint(ipAddress, int.Parse(ss[1]));
    }
}
```

2.5 RouterHelper: 路由器帮助类，向路由器注册、申请？

```
public static class RouterHelper {
    // 注册 router
    public static async ETTask<Session> CreateRouterSession(Scene clientScene, IPEndPoint address) {
        (uint recvLocalConn, IPEndPoint routerAddress) = await GetRouterAddress(clientScene, address, 0, 0);
        if (recvLocalConn == 0)
            throw new Exception($"get router fail: {clientScene.Id} {address}");
        Log.Info($"get router: {recvLocalConn} {routerAddress}");
        Session routerSession = clientScene.GetComponent<NetClientComponent>().Create(routerAddress, address, recvLocalConn
        routerSession.AddComponent<PingComponent>();
        routerSession.AddComponent<RouterCheckComponent>();
        return routerSession;
    }
    public static async ETTask<(uint, IPEndPoint)> GetRouterAddress(Scene clientScene, IPEndPoint address, uint localConn,
        Log.Info($"start get router address: {clientScene.Id} {address} {localConn} {remoteConn}");
        // return (RandomHelper.RandUInt32(), address);
        RouterAddressComponent routerAddressComponent = clientScene.GetComponent<RouterAddressComponent>();
        IPEndPoint routerInfo = routerAddressComponent.GetAddress();
        uint recvLocalConn = await Connect(routerInfo, address, localConn, remoteConn);
        Log.Info($"finish get router address: {clientScene.Id} {address} {localConn} {remoteConn} {recvLocalConn} {routerIn
        return (recvLocalConn, routerInfo);
    }
    // 向 router 申请
    private static async ETTask<uint> Connect(IPEndPoint routerAddress, IPEndPoint realAddress, uint localConn, uint remote
        uint connectId = RandomGenerator.RandUInt32();
        using Socket socket = new Socket(routerAddress.AddressFamily, SocketType.Dgram, ProtocolType.Udp);
        int count = 20;
        byte[] sendCache = new byte[512];
        byte[] recvCache = new byte[512];
        uint synFlag = localConn == 0? KcpProtocalType.RouterSYN : KcpProtocalType.RouterReconnectSYN;
        sendCache.WriteTo(0, synFlag);
        sendCache.WriteTo(1, localConn);
        sendCache.WriteTo(5, remoteConn);
        sendCache.WriteTo(9, connectId);
        byte[] addressBytes = realAddress.ToString().ToByteArray();
        Array.Copy(addressBytes, 0, sendCache, 13, addressBytes.Length);
        Log.Info($"router connect: {connectId} {localConn} {remoteConn} {routerAddress} {realAddress}");

        EndPoint recvIPEndPoint = new IPEndPoint(IPAddress.Any, 0);
        long lastSendTimer = 0;
        while (true) {
            long timeNow = TimeHelper.ClientFrameTime();
            if (timeNow - lastSendTimer > 300) {
                if (--count < 0) {
                    Log.Error($"router connect timeout fail! {localConn} {remoteConn} {routerAddress} {realAddress}");
                    return 0;
                }
                lastSendTimer = timeNow;
                // 发送
                socket.SendTo(sendCache, 0, addressBytes.Length + 13, SocketFlags.None, routerAddress);
            }
            await TimerComponent.Instance.WaitFrameAsync();
            // 接收
            if (socket.Available > 0) {
                int messageLength = socket.ReceiveFrom(recvCache, ref recvIPEndPoint);
                if (messageLength != 9) {
```

```
                    Log.Error($"router connect error1: {connectId} {messageLength} {localConn} {remoteConn} {routerAddress}
                    continue;
                }
                byte flag = recvCache[0];
                if (flag != KcpProtocalType.RouterReconnectACK && flag != KcpProtocalType.RouterACK) {
                    Log.Error($"router connect error2: {connectId} {synFlag} {flag} {localConn} {remoteConn} {routerAddress
                    continue;
                }
                uint recvRemoteConn = BitConverter.ToUInt32(recvCache, 1);
                uint recvLocalConn = BitConverter.ToUInt32(recvCache, 5);
                Log.Info($"router connect finish: {connectId} {recvRemoteConn} {recvLocalConn} {localConn} {remoteConn} {ro
                return recvLocalConn;
            }
        }
    }
}
```

2.6 StartProcessConfigCategory : ConfigSingleton<StartProcessConfigCateg IMerge: 【任何时候，活宝妹就是一定要嫁给亲爱的表哥!!!】

```
[ProtoContract]
[Config]
public partial class StartProcessConfigCategory : ConfigSingleton<StartProcessConfigCategory>, IMerge {
    [ProtoIgnore]
    [BsonIgnore]
    private Dictionary<int, StartProcessConfig> dict = new Dictionary<int, StartProcessConfig>(); // 管理字典
    [BsonElement]
    [ProtoMember(1)]
    private List<StartProcessConfig> list = new List<StartProcessConfig>();
    public void Merge(object o) {
        StartProcessConfigCategory s = o as StartProcessConfigCategory;
        this.list.AddRange(s.list);
    }
    [ProtoAfterDeserialization]
    public void ProtoEndInit() {
        foreach (StartProcessConfig config in list) {
            config.AfterEndInit();
            this.dict.Add(config.Id, config);
        }
        this.list.Clear();
        this.AfterEndInit();
    }
    public StartProcessConfig Get(int id) {
        this.dict.TryGetValue(id, out StartProcessConfig item);
        if (item == null) {
            throw new Exception($" 配置找不到，配置表名: {nameof (StartProcessConfig)}, 配置 id: {id}");
        }
        return item;
    }
    public bool Contain(int id) {
        return this.dict.ContainsKey(id);
    }
    public Dictionary<int, StartProcessConfig> GetAll() {
        return this.dict;
    }
    public StartProcessConfig GetOne() {
        if (this.dict == null || this.dict.Count <= 0) {
            return null;
        }
        return this.dict.Values.GetEnumerator().Current;
    }
}
[ProtoContract]
public partial class StartProcessConfig: ProtoObject, IConfig {
    [ProtoMember(1)]
    public int Id { get; set; }
    [ProtoMember(2)]
    public int MachineId { get; set; }
    [ProtoMember(3)]
    public int InnerPort { get; set; }
}
```

2.7 StartSceneConfig: ISupportInitialize 【各种服 - 配置，场景配置】

```
public partial class StartSceneConfig: ISupportInitialize {
    public long InstanceId;
    public SceneType Type; // 场景类型

    public StartProcessConfig StartProcessConfig {
        get {
            return StartProcessConfigCategory.Instance.Get(this.Process);
        }
    }
    public StartZoneConfig StartZoneConfig {
        get {
            return StartZoneConfigCategory.Instance.Get(this.Zone);
        }
    }
    // 内网地址外网端口，通过防火墙映射端口过来
    private IPEndPoint innerIPOutPort;
    public IPEndPoint InnerIPOutPort {
        get {
            if (innerIPOutPort == null) {
                this.innerIPOutPort = NetworkHelper.ToIPEndPoint($"{this.StartProcessConfig.InnerIP}:{this.OuterPort}");
            }
            return this.innerIPOutPort;
        }
    }
    // 外网地址外网端口
    private IPEndPoint outerIPPort;
    public IPEndPoint OuterIPPort {
        get {
            if (this.outerIPPort == null) {
                this.outerIPPort = NetworkHelper.ToIPEndPoint($"{this.StartProcessConfig.OuterIP}:{this.OuterPort}");
            }
            return this.outerIPPort;
        }
    }
    public override void AfterEndInit() {
        this.Type = EnumHelper.FromString<SceneType>(this.SceneType);
        InstanceIdStruct instanceIdStruct = new InstanceIdStruct(this.Process, (uint) this.Id);
        this.InstanceId = instanceIdStruct.ToLong();
    }
}
```

2.8 StartSceneConfigCategory : 【Matchs!】ConfigSingleton<StartSceneConfi IMerge

- 读里面的登录服，会知道它是如何管理登录服的（就是后面的例子，当它要拿登录服的地址的时候），它们是区服，就是分各个小区管理。如果集群是这个样子，大概匹配服也就是一样分小区管理了。
- 那么这个配置管理里，因为我要用匹配服与地图服，也要对至少是匹配服进行管理。那么，我在申请匹配的时候，网关服才能拿到匹配服的地址。
- 只在【服务端】存在。但是在双端模式、与服务端模式下，每种端有两个文件来定义这个类。。一个在【ProtoContract】里，可能可以进程间消息传递？一个在 ConfigPartial 文件夹里
- 上面的文件重复，还不是很懂。【重构】：因为我现在还比较喜欢使用 Unity 下自带的双端模式，可是暂时只改【双端模式 ClientServer】下的文件，另一个专职服务端可能晚点儿再补上去。不用昨天晚上一样每个文件都改。

```
// 配置文件处理，或是服务器启动相关类，以前都没仔细读过
public partial class StartSceneConfigCategory {
    public MultiMap<int, StartSceneConfig> Gates = new MultiMap<int, StartSceneConfig>();
    public MultiMap<int, StartSceneConfig> ProcessScenes = new MultiMap<int, StartSceneConfig>();
    public Dictionary<long, Dictionary<string, StartSceneConfig>> ClientScenesByName = new Dictionary<long, Dictionary<stri
    public StartSceneConfig LocationConfig;
    public List<StartSceneConfig> Realms = new List<StartSceneConfig>();
    public List<StartSceneConfig> Matchs = new List<StartSceneConfig>(); // <<<<<<<<<<<<<<<<<<< 添加管理
```

```
    public List<StartSceneConfig> Routers = new List<StartSceneConfig>();
    public List<StartSceneConfig> Robots = new List<StartSceneConfig>();
    public StartSceneConfig BenchmarkServer;

    public List<StartSceneConfig> GetByProcess(int process) {
        return this.ProcessScenes[process];
    }
    public StartSceneConfig GetBySceneName(int zone, string name) {
        return this.ClientScenesByName[zone][name];
    }
    public override void AfterEndInit() {
        foreach (StartSceneConfig startSceneConfig in this.GetAll().Values) {
            this.ProcessScenes.Add(startSceneConfig.Process, startSceneConfig);

            if (!this.ClientScenesByName.ContainsKey(startSceneConfig.Zone)) {
                this.ClientScenesByName.Add(startSceneConfig.Zone, new Dictionary<string, StartSceneConfig>());
            }
            this.ClientScenesByName[startSceneConfig.Zone].Add(startSceneConfig.Name, startSceneConfig);

            switch (startSceneConfig.Type) {
            case SceneType.Realm:
                this.Realms.Add(startSceneConfig);
                break;
            case SceneType.Gate:
                this.Gates.Add(startSceneConfig.Zone, startSceneConfig);
                break;
            case SceneType.Match:                   // <<<<<<<<<<<<<<<<<<< 自己加的
                this.Matchs.Add(startSceneConfig); // <<<<<<<<<<<<<<<<<<<
                break;
            case SceneType.Location:
                this.LocationConfig = startSceneConfig;
                break;
            case SceneType.Robot:
                this.Robots.Add(startSceneConfig);
                break;
            case SceneType.Router:
                this.Routers.Add(startSceneConfig);
                break;
            case SceneType.BenchmarkServer:
                this.BenchmarkServer = startSceneConfig;
                break;
            }
        }
    }
}
```

2.9 HttpGetRouterResponse: 这个 ProtoBuf 的消息类型

- 框架里，有个专用的路由器管理器场景（服），对路由器，或说各种服的地址进行管理
- 主要是方便，一个路由器管理组件，来自顶向下地获取，各小区所有路由器地址的？想来当组件要拿地址时，每个小区分服都把自己的地址以消息的形式传回去的？

```
[Message(OuterMessage.HttpGetRouterResponse)]
[ProtoContract]
public partial class HttpGetRouterResponse: ProtoObject {
    [ProtoMember(1)]
    public List<string> Realms { get; set; }
    [ProtoMember(2)]
    public List<string> Routers { get; set; }
}
message HttpGetRouterResponse { // 这里，是 Outer proto 里的消息定义
^^Irepeated string Realms = 1;
^^Irepeated string Routers = 2;
^^Irepeated string Matchs = 3;// 这行是我需要添加，和生成消息的
}
```

2.10 HttpGetRouterHandler : IHttpHandler: 获取各路由器的地址

- 【匹配服】：因为我想拿这个服的地址，也需要这个帮助类里作相应的修改

- StartSceneConfigCategory.Instance: 不明白这个实例是存放在哪里，因为可以 proto 消息进程间传递，那么可以试找，哪里调用这个帮助类拿东西?
- 这个模块：现在还是理解不透。需要某个上午，把所有 RouterComponent 组件及其相关，再理一遍。

```
[HttpHandler(SceneType.RouterManager, "/get_router")]
public class HttpGetRouterHandler : IHttpHandler {
    public async ETTask Handle(Entity domain, HttpListenerContext context) {
        HttpGetRouterResponse response = new HttpGetRouterResponse();
        response.Realms = new List<string>();
        response.Matchs = new List<string>();// 匹配服链表  // <<<<<<<<<<<<<<<<<<<<
        response.Routers = new List<string>();
        // 是去 StartSceneConfigCategory 这里拿的: 因为它可以 proto 消息里、进程间传递，这里还不是很懂，这个东西存放在哪里
        foreach (StartSceneConfig startSceneConfig in StartSceneConfigCategory.Instance.Realms) {
            response.Realms.Add(startSceneConfig.InnerIPOutPort.ToString());
        }
        foreach (StartSceneConfig startSceneConfig in StartSceneConfigCategory.Instance.Matchs) {
            response.Matchs.Add(startSceneConfig.InnerIPOutPort.ToString());
        }
        foreach (StartSceneConfig startSceneConfig in StartSceneConfigCategory.Instance.Routers) {
            response.Routers.Add($"{startSceneConfig.StartProcessConfig.OuterIP}:{startSceneConfig.OuterPort}");
        }
        HttpHelper.Response(context, response);
        await ETTask.CompletedTask;
    }
}
```

2.11 HttpHandler 标签系：标签自带场景类型

```
public class HttpHandlerAttribute: BaseAttribute {
    public SceneType SceneType { get; }
    public string Path { get; }
    public HttpHandlerAttribute(SceneType sceneType, string path) {
        this.SceneType = sceneType;
        this.Path = path;
    }
}
```

2.12 LoginHelper: 登录服的获取地址的方式来获取匹配服的地址了。全框架只有这一个黄金案例

- 这个是用户登录前，还没能与网关服建立起任何关系，可能会不得不绕得复杂一点儿】：它就是用户登录前、登录时，若是客户端场景还没有这个组件，就添加一下，没什么奇怪的。

```
public static class LoginHelper {
    public static async ETTask Login(Scene clientScene, string account, string password) {
        try {
            // 创建一个 ETModel 层的 Session
            clientScene.RemoveComponent<RouterAddressComponent>();
            // 获取路由跟 realmDispatcher 地址
            RouterAddressComponent routerAddressComponent = clientScene.GetComponent<RouterAddressComponent>();
            if (routerAddressComponent == null) {
                routerAddressComponent = clientScene.AddComponent<RouterAddressComponent, string, int>(ConstValue.RouterHtt
                await routerAddressComponent.Init();
                clientScene.AddComponent<NetClientComponent, AddressFamily>(routerAddressComponent.RouterManagerIPAddress.A
            }
            IPEndPoint realmAddress = routerAddressComponent.GetRealmAddress(account); // <<<<<<<<<<<<<<<<<<<< 这里就是说，我
            R2C_Login r2CLogin;
            using (Session session = await RouterHelper.CreateRouterSession(clientScene, realmAddress)) {
                r2CLogin = (R2C_Login) await session.Call(new C2R_Login() { Account = account, Password = password });
            }
            // 创建一个 gate Session, 并且保存到 SessionComponent 中: 与网关服的会话框。主要负责用户下线后会话框的自动移除销毁
            Session gateSession = await RouterHelper.CreateRouterSession(clientScene, NetworkHelper.ToIPEndPoint(r2CLogin.A
            clientScene.AddComponent<SessionComponent>().Session = gateSession;
            G2C_LoginGate g2CLoginGate = (G2C_LoginGate)await gateSession.Call(
                new C2G_LoginGate() { Key = r2CLogin.Key, GateId = r2CLogin.GateId});
            Log.Debug(" 登陆 gate 成功!");
            await EventSystem.Instance.PublishAsync(clientScene, new EventType.LoginFinish());
```

```
        }
        catch (Exception e) {
            Log.Error(e);
        }
    }
}
```

2.13 GateSessionKeyComponent:

```
[ComponentOf(typeof(Scene))]
public class GateSessionKeyComponent : Entity, IAwake {
    public readonly Dictionary<long, string> sessionKey = new Dictionary<long, string>();
}
```

3 ET7 数据库相关【服务端】

- 这个数据库系统，连个添加使用的范例也没有。。。就两个组件，一个管理类。什么也没留下。。
- 这里不急着整理。现框架 **DB 放在服务端的 Model** 里。它的管理体系成为管理各个不同区服的数据库 DBComponent。
- 因为找不到任何参考使用的例子。我觉得需要搜索一下。在理解了参考项目数据库模块之后，根据搜索，决定是使用原参考项目总服务器代理系，还是这种相对改装了的管理区服系统?

3.1 IDBCollection: 主要是方便写两个不同的数据库（好像是 GeekServer 里两个数据库）。反正方便扩展吧

```
public interface IDBCollection {}
```

3.2 DBComponent: 带生成系。可以查表，查询数据

```
[ChildOf(typeof(DBManagerComponent))] // 用来缓存数据
public class DBComponent: Entity, IAwake<string, string, int>, IDestroy {
    public const int TaskCount = 32;
    public MongoClient mongoClient;
    public IMongoDatabase database;
}
```

3.3 DBManagerComponent: 有上面的 DBComponent 数组。数组长度固定吗？

```
public class DBManagerComponent: Entity, IAwake, IDestroy {
    [StaticField]
    public static DBManagerComponent Instance;
    public DBComponent[] DBComponents = new DBComponent[IdGenerater.MaxZone]; // 没事吃饱了撑得，占一大堆空地
}
```

3.4 DBManagerComponentSystem: 主是要查询某个区服的数据库，从数组里

```
[FriendOf(typeof(DBManagerComponent))]
public static class DBManagerComponentSystem {
    [ObjectSystem]
    public class DBManagerComponentAwakeSystem: AwakeSystem<DBManagerComponent> {
        protected override void Awake(DBManagerComponent self) {
            DBManagerComponent.Instance = self;
        }
    }
    [ObjectSystem]
    public class DBManagerComponentDestroySystem: DestroySystem<DBManagerComponent> {
        protected override void Destroy(DBManagerComponent self) {
```

```
            DBManagerComponent.Instance = null;
        }
    }
    public static DBComponent GetZoneDB(this DBManagerComponent self, int zone) {
        DBComponent dbComponent = self.DBComponents[zone];
        if (dbComponent != null)// 如果已经管理配置好，直接返回
            return dbComponent;
        StartZoneConfig startZoneConfig = StartZoneConfigCategory.Instance.Get(zone);
        if (startZoneConfig.DBConnection == "")// 小区域里如果没有匹配或是出错，抛异常
            throw new Exception($"zone: {zone} not found mongo connect string");
// 把这个小区域里的数据库配置好，加入系统管理，并返回
        dbComponent = self.AddChild<DBComponent, string, string, int>(startZoneConfig.DBConnection, startZoneConfig.DBName,
        self.DBComponents[zone] = dbComponent;
        return dbComponent;
    }
}
```

3.5 DBProxyComponent: 【参考项目】里的。有生成系。

```
// 用来与数据库操作代理
public class DBProxyComponent: Component {
    public IPEndPoint dbAddress;
}
```

3.6 StartZoneConfigCategory: 单例区服配置管理类

- 主要还是要把整个框架系统性的都弄懂了

```
    [ProtoContract]
    [Config]
    public partial class StartZoneConfigCategory : ConfigSingleton<StartZoneConfigCategory>, IMerge {
        [ProtoIgnore]
        [BsonIgnore]
        private Dictionary<int, StartZoneConfig> dict = new Dictionary<int, StartZoneConfig>();
        [BsonElement]
        [ProtoMember(1)]
        private List<StartZoneConfig> list = new List<StartZoneConfig>();
        public void Merge(object o) {
            StartZoneConfigCategory s = o as StartZoneConfigCategory;
            this.list.AddRange(s.list);
        }
        [ProtoAfterDeserialization]
        public void ProtoEndInit() {
            foreach (StartZoneConfig config in list) {
                config.AfterEndInit();
                this.dict.Add(config.Id, config);
            }
            this.list.Clear();
            this.AfterEndInit();
        }
        public StartZoneConfig Get(int id) {
            this.dict.TryGetValue(id, out StartZoneConfig item);
            if (item == null)
                throw new Exception($" 配置找不到，配置表名: {nameof (StartZoneConfig)}, 配置 id: {id}");
            return item;
        }
        public bool Contain(int id) {
            return this.dict.ContainsKey(id);
        }
        public Dictionary<int, StartZoneConfig> GetAll() {
            return this.dict;
        }
        public StartZoneConfig GetOne() {
            if (this.dict == null || this.dict.Count <= 0)
                return null;
            return this.dict.Values.GetEnumerator().Current;
        }
    }
    [ProtoContract]
    public partial class StartZoneConfig: ProtoObject, IConfig {// 小区配置
        [ProtoMember(1)]
        public int Id { get; set; }
```

```
        // 数据库地址
        [ProtoMember(2)]
        public string DBConnection { get; set; }
        // 数据库名
        [ProtoMember(3)]
        public string DBName { get; set; }
    }
```

4 网关服：客户端信息发送的直接代理，中转站，组件分析

- SceneFactory: 【初始化】时，带如下几个组件

```
public static class SceneFactory {
    public static async ETTask<Scene> CreateServerScene(Entity parent, long id, long instanceId, int zone, string name, Sce
        await ETTask.CompletedTask;
        Scene scene = EntitySceneFactory.CreateScene(id, instanceId, zone, sceneType, name, parent);
        // 任何场景：无序消息分发器，可接收消息，队列处理；发呢？
        scene.AddComponent<MailBoxComponent, MailboxType>(MailboxType.UnOrderMessageDispatcher); // 重构？应该是对进程间消息发

        switch (scene.SceneType) {
            case SceneType.Router:
                scene.AddComponent<RouterComponent, IPEndPoint, string>(startSceneConfig.OuterIPPort, startSceneConfig.Star
                break;
            case SceneType.RouterManager: // 正式发布请用 CDN 代替 RouterManager
                // 云服务器在防火墙那里做端口映射
                scene.AddComponent<HttpComponent, string>($"http:// *:{startSceneConfig.OuterPort}/");
                break;
            // // case SceneType.Realm: // 注册登录服：
            // //     scene.AddComponent<NetServerComponent, IPEndPoint>(startSceneConfig.InnerIPOutPort);
            // //     break;
            case SceneType.Gate:
                scene.AddComponent<NetServerComponent, IPEndPoint>(startSceneConfig.InnerIPOutPort);
                scene.AddComponent<PlayerComponent>();
                scene.AddComponent<GateSessionKeyComponent>();
                break; // ...
```

4.1 NetServerComponent:

```
public struct NetServerComponentOnRead {
    public Session Session;
    public object Message;
}
[ComponentOf(typeof(Scene))]
public class NetServerComponent: Entity, IAwake<IPEndPoint>, IDestroy {
    public int ServiceId;
}
```

5 服务器的功能概述：各服务器的作用（这个不是 ET7 版本的，以前的）

- Manager：连接客户端的外网和连接内部服务器的内网，对服务器进程进行管理，自动检测和启动服务器进程。加载有内网组件 NetInnerComponent，外网组件 NetOuterComponent，服务器进程管理组件。自动启动突然停止运行的服务器，保证此服务器管理的其它服务器崩溃后能及时自动启动运行。
- Realm：对 Actor 消息进行管理（添加、移除、分发等），连接内网和外网，对内网服务器进程进行操作，随机分配 Gate 服务器地址。内网组件 NetInnerComponent，外网组件 NetOuterComponent，Gate 服务器随机分发组件。客户端登录时连接的第一个服务器，也可称为登录服务器。
- Gate：对玩家进行管理，对 Actor 消息进行管理（添加、移除、分发等），连接内网和外网，对内网服务器进程进行操作，随机分配 Gate 服务器地址，对 Actor 消息进程进行管理，对玩

家 ID 登录后的 Key 进行管理。加载有玩家管理组件 PlayerComponent，管理登陆时联网的 Key 组件 GateSessionKeyComponent。

- Location：连接内网，服务器进程状态集中管理（Actor 消息 IP 管理服务器）。加载有内网组件 NetInnerComponent，服务器消息处理状态存储组件 LocationComponent。对客户端的登录信息进行验证和客户端登录后连接的服务器，登录后通过此服务器进行消息互动，也可称为验证服务器。
- Map：连接内网，对 ActorMessage 消息进行管理（添加、移除、分发等），对场景内现在活动物体存储管理，对内网服务器进程进行操作，对 Actor 消息进程进行管理，对 Actor 消息进行管理（添加、移除、分发等），服务器帧率管理。服务器帧率管理组件 ServerFrameComponent。
- AllServer：将以上服务器功能集中合并成一个服务器。另外增加 DB 连接组件 DBComponent
- Benchmark：连接内网和测试服务器承受力。加载有内网组件 NetInnerComponent，服务器承受力测试组件 BenchmarkComponent。

6 Session 会话框相关

- 当需要连的时候，比如网关服与匹配服，新的框架里连接时容易出现困难，找不到组件，或是用不对组件，或是组件用得不对，端没能分清楚。理解不够。
- 就是说，这个新的 ET7 框架下，服务端的这些，事件机制的，没弄明白没弄透彻。

7 不同的消息或是任务处理器类型

7.1 interface IMActorHandler 接口类

```
public interface IMActorHandler {
    // ETTask Handle(Entity entity, int fromProcess, object actorMessage);
    void Handle(Entity entity, int fromProcess, object actorMessage); // 自己改成这样的：【返回类型
    Type GetRequestType();
    Type GetResponseType();
}
```

7.2 AMHandler<Message>: IMHandler

```
public abstract class AMHandler<Message>: IMHandler where Message : class {
    // protected abstract ETTask Run(Session session, Message message);
    protected abstract void Run(Session session, Message message);
    public void Handle(Session session, object msg) {
        Message message = msg as Message;
        if (message == null) {
            Log.Error($" 消息类型转换错误: {msg.GetType().Name} to {typeof (Message).Name}");
            return;
        }
        if (session.IsDisposed) {
            Log.Error($"session disconnect {msg}");
            return;
        }
        this.Run(session, message).Coroutine();
    }
    public Type GetMessageType() {
        return typeof (Message);
    }
    public Type GetResponseType() {
        return null;
    }
}
```

7.3 AMActorRpcHandler<E, Request, Response>: IMActorHandler void|ETTa 分不清

```
[EnableClass]
public abstract class AMActorRpcHandler<E, Request, Response>: IMActorHandler where E : Entity where Request : class, IActo
    // protected abstract ETTask Run(E unit, Request request, Response response);
    protected abstract void Run(E unit, Request request, Response response);
    public async ETTask Handle(Entity entity, int fromProcess, object actorMessage) {
        try {
            if (actorMessage is not Request request) {
                Log.Error($" 消息类型转换错误: {actorMessage.GetType().FullName} to {typeof (Request).Name}");
                return;
            }
            if (entity is not E ee) {
                Log.Error($"Actor 类型转换错误: {entity.GetType().Name} to {typeof (E).Name} --{typeof (Request).Name}");
                return;
            }
            int rpcId = request.RpcId;
            Response response = Activator.CreateInstance<Response>();
            try {
                // await this.Run(ee, request, response);
                this.Run(ee, request, response);
            }
            catch (Exception exception) {
                Log.Error(exception);
                response.Error = ErrorCore.ERR_RpcFail;
                response.Message = exception.ToString();
            }
            response.RpcId = rpcId;
            ActorHandleHelper.Reply(fromProcess, response);
        }
        catch (Exception e) {
            throw new Exception($" 解释消息失败: {actorMessage.GetType().FullName}", e);
        }
    }
    public Type GetRequestType() {
        if (typeof (IActorLocationRequest).IsAssignableFrom(typeof (Request)))
            Log.Error($"message is IActorLocationMessage but handler is AMActorRpcHandler: {typeof (Request)}");
        return typeof (Request);
    }
    public Type GetResponseType() {
        return typeof (Response);
    }
}
```

7.4

8 Unit: 不明白它是什么，不太懂

8.1 UnitGateComponent:

```
[ComponentOf(typeof(Unit))]
public class UnitGateComponent : Entity, IAwake<long>, ITransfer {
    public long GateSessionActorId { get; set; }
}
```

8.2 UnitGateComponentSystem

```
public static class UnitGateComponentSystem {
    public class UnitGateComponentAwakeSystem : AwakeSystem<UnitGateComponent, long> {
        protected override void Awake(UnitGateComponent self, long a) {
            self.GateSessionActorId = a;
        }
    }
}
```

9 Protobuf 相关，【Protobuf 里进程间传递的游戏数据相关信息：两个思路】

- 【一、】查找 enum 可能可以用系统平台下的 protoc 来代为生成，效果差不多。只起现 Proto2CS.cs 编译的补充作用。
- 【二、】Card 类下的两个 enum 变量，在 ILRuntime 热更新库下，还是需要帮它连一下的。用的是 HybridCLR
- 【三、】查找 protoc 命令下，如何 C# 索引 Unity 第三方库。
- 【四、】repeated 逻辑没有处理好

```
message Actor_GamerPlayCard_Req // IActorRequest
{
^^Iint32 RpcId = 90;
^^Iint64 ActorId = 91;
    repeated ET Card Cards = 1;
}
```

- 【Windows 下的 Protobuf 编译环境】：配置好，只是作为与 ET 框架的 Proto2CS.cs 所指挥的编译结果，作一个对比，两者应该效果是一样的，或是基本一样的，除了自定义里没有处理 enum.
- Windows 下的命令行，就是用 protoc 来编译，可以参考如下.（这是.cs 源码下的）

```
CommandRun($"protoc.exe", $"--csharp_out=\"./{outputPath}\" --proto_path=\"{protoPath}\" {protoName}");
```

- 现在的问题是，**Protobuf 消息里面居然是有 unity 第三方库的索引**。
- 直接把 enum 生成的那三个.cs 类分别复制进双端，服务器端与客户端。包括 Card 类。那些编译错误会去天边。哈哈哈，除了一个 Card 的两个变量之外（CardSuits, CardWeight）。
- 【热更新库】：现在剩下的问题，就成为，判定是用了哪个热更新的库，ILRuntime, 还是 HybridCLR, 如果帮它连那两个变量。好像接的是 HybridCLR. 这个库是我之前还不曾真正用过的。
  - 相比于 ET6，彻底剔除了 ILRuntime，使得代码简洁了不少，并且比较稳定

10 写在最后：反而是自己每天查看一再更新的

- 因为感觉还是不曾系统性地读 ET7 的源码，或者说有效阅读，因为没有带着实际问题的看源码，感觉都不叫看读源码呀。这里会记自己的感觉需要赶快查看的地方。
- 【ET 框架的整体架构】：感觉把握不够。常常命名空间分不清。要把这个大的框架，比较高层面的架构再好好看下。然后就是对自顶向下的不同层级场景，所需要的主要的不同组件，分不清，仍需要再熟悉一下源码
- 【问题】：某些消息，还分不清是内网还是外网消息，暂时先放一下，到时再改
- 【问题】：上次那个 ET-EUI 框架的时候，曾经出现过 opcode 不对应，也就是说，我现在生成的进程间消息，有可能还是会存在服务器码与客户端码不对应，这个完备的框架，这次应该不至于吧？
- 【ClientComponent】：新框架里重构丢了，去找怎么替代？那么现在去追一下，客户端的起始与场景加载或是切换大致过程。它变成了什么客户端场景管理？
- 【UIType】部分类：这个类出现在了三四个不同的程序域，现在重构了，好像添加得不对。要再修改

11 现在的修改内容：

- **【ET7 框架】**没有处理的逻辑是：**【ET7 框架里数据库的接入】**
- **【Windows 下 proto2cs 消息转化】**：ProtoBuf 这个库里还存在几个问题，enum-repeated 等关键字，因为程序域的问题等，没能连能
- **【UILobbyComponent 可以测试】**：这个大厅组件，Unity 里预设简单，可以试运行一下，看是否完全消除这个 UI 组件的报错，这个屏的控件能否显示出来？还是错出得早，这个屏就出不来已经报错了？
  - 【客户端】的逻辑是处理好了，编译全过后可以测试
  - 【服务端】：处理用户请求匹配房间的逻辑，仍在处理：**C2G_StartMatch_ReqHandler**.
- **【TractorRoomComponent】**：因为是多组件嵌套，可以合并多组件为同一个组件；另早上看得一知半解的一个【ChildOf】标签，可以帮助组件套用吗？再找找理解消化一下
- 【房间组件】：几个现存的 working-on 的问题：
  - 多组件嵌套：手工合并为一个组件。彻底理解确认后，会合并
  - 【服务端】：处理用户请求匹配房间的逻辑. 这里的编译错误终于改完。到时就看运行时错误了。
    * 【数据库模块的整合】：网关服在转发请求匹配时，验证会话框有效后，验证用户身份时，需要去【用户数据库】拿用户数据。ET7 留了个 DBManagerComponent, 还没能整合出这个模块

    -【参考来源 **C2R_LoginHandler** 】：Realm 处理客户端的登录请求的服务端逻辑。这里看见，它随机分配一个网关服。也就是，我（原本本质上也是随机分配）一个匹配服给用。可以依照这里的例子来改写。
- **【服务端的编译错误】**基本上扫了一遍。【客户端】因为这些前期的工作，以及拖拉机项目重构设计还没有想透彻，暂停一下。
- 【接下来的内容】：**【重构拖拉机项目】**。把 ET7 框架里【参考项目】的设计看懂，并借助这个例子，把拖拉机项目设计好。
- 有时间，会试着尽早解决上面 ProtoBuf 里的几个小问题。但现在需要重构的设计思路，客户端的界面等才能够往下进行。

12 TODO 其它的：部分完成，或是待完成的大的功能版块，列举

- emacs 那天我弄了好久，把 C-; ISpell 原定绑定的功能解除，重新绑定为自己喜欢的 expand-region. 今天第二次再弄，看一下几分钟能够解决完问题? 我的这个破烂记性呀。。。【爱表哥，爱生活!!! 任何时候，活宝妹就是一定要嫁给亲爱的表哥!!!】mingw64 lisp/textmode/flyspell.el 键的重新绑定。这下记住了。还好，花得不是太久。有以前的笔记
  - Windows 10 平台下，C-; 是绑定到了 ISpell 下的某个功能，可是现在这个破 emacs 老报错，连查是绑定给哪个功能，过程报错都被阻止了。。。
- **【IStartSystem:】**感觉还有点儿小问题。认为：我应该不需要同文件两份，一份复制到客户端热更新域。我认为，全框架应该如其它接口类一样，只要一份就可以了。**【晚点儿再检查一遍】**
- 如果这个一时半会儿解决不好，就把重构的设计思路再理一理。同时尽量去改重构的 ET 框架里的编译错误。

- 【Tractor】原 windows-form 项目，源码需要读懂，理解透彻，方便重构。
- 去把【拖拉机房间、斗地主房间组件的，玩家什么的一堆组件】弄明白
- 【任何时候，活宝妹就是一定要嫁给亲爱的表哥!!! 爱表哥，爱生活!!!】

13 拖拉机游戏:【重构 OOP/OOD 设计思路】

- 自己是学过，有这方面的意识，但并不是说，自己就懂得，就知道该如何狠好地设计这些类。现在更多的是要受 ET 框架，以及参考游戏手牌设计的启发，来帮助自己一再梳理思路，该如何设计它。
- ET7 重构里，各组件都该是自己设计重构原项目的类的设计的必要起点。可以根据这些来系统设计重构。【活宝妹就是一定要嫁给亲爱的表哥!!!】
- 【GamerComponent】玩家组件管理类，管理所有一个房间的玩家：是对一个房间里四个玩家的（及其在房间里的坐位位置）管理（分东南西北）。可以添加移除玩家。今天晚上来弄这一块儿吧。
- 【Gamer】：每一个玩家
- 【拖拉机游戏房间】：多组件构成
- 【爱表哥，爱生活!!! 活宝妹就是一定要嫁给亲爱的表哥！爱表哥，爱生活!!!】
- 【活宝妹坐等亲爱的表哥，领娶活宝妹回家！爱表哥，爱生活!!!】