分布式事务Seata源码分析

主讲老师：Fox

Seata调试环境搭建

源码拉取

源码： https://github.com/seata/seata.git

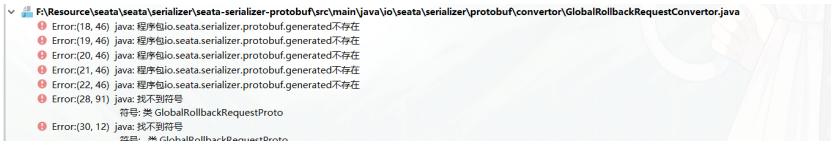
官方Demo： https://github.com/seata/seata-samples.git

源码编译

seata编译版本： checkout tag v1.4.0

源码编译问题：

seata源码导入到idea中第一次启动server端的时候，编译会报错如下：



问题原因：缺少protobuf编译的java文件

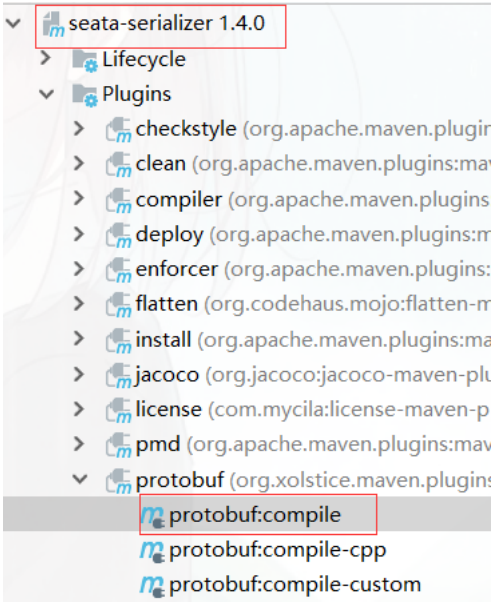
解决方案：idea安装protobuf support插件，重启idea。

插件下载地址： https://github.com/ksprojects/protobuf-jetbrains-plugin

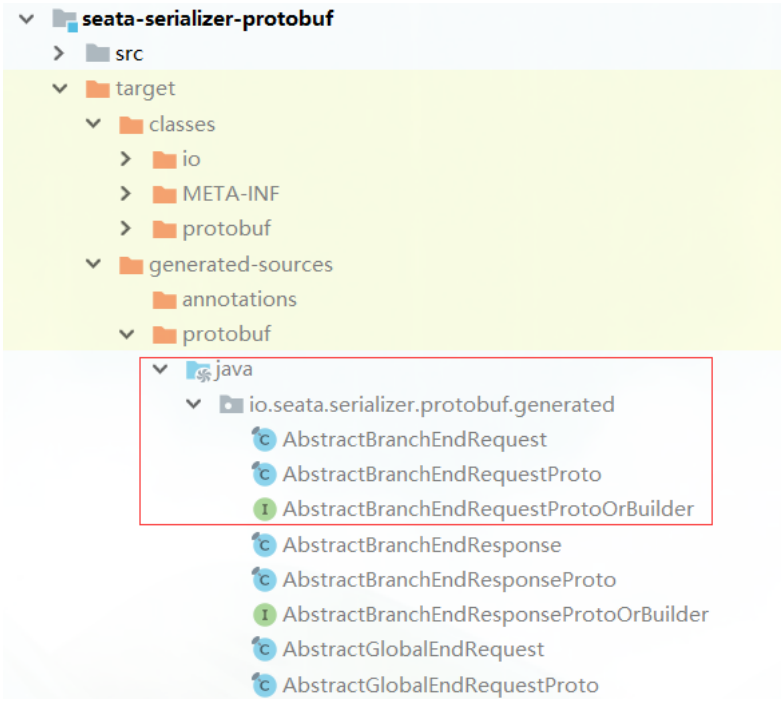
注意idea版本不能高于插件版本

Plugin Version	IDE Version Range
0.11.0	IDEA 2018.2
0.9.0	IDEA 2017.1
0.8.0	IDEA 2016.1
0.6.0	IDEA 13 - IDEA 15

通过protobuf:compile编译seata-serializer包

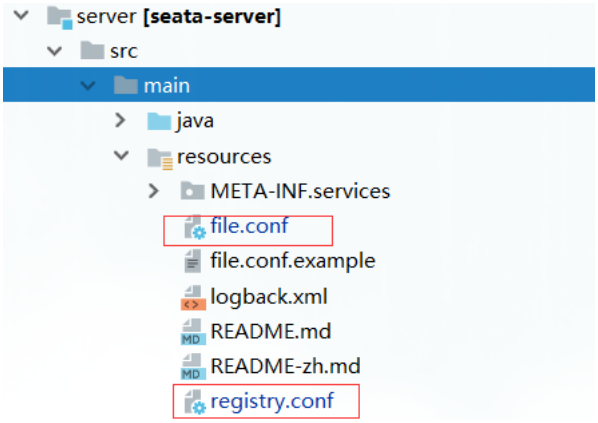


执行之后就会生成java代码



配置db存储模式

修改resources下的file.conf，修改store.mode="db"，修改store.db相关配置



启动Seata TC Server服务

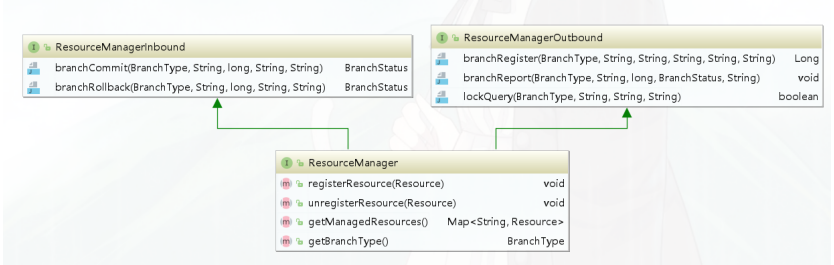
先启动nacos server服务，然后找到server模块下io.seata.server.Server.java，执行main方法启动

```
INFO --- [           main] io.seata.config.FileConfiguration        : The configuration file used is registry.conf
INFO --- [           main] io.seata.config.FileConfiguration        : The configuration file used is file.conf
INFO --- [           main] com.alibaba.druid.pool.DruidDataSource   : {dataSource-1} inited
INFO --- [           main] i.s.core.rpc.netty.NettyServerBootstrap  : Server started, listen port: 8091
```

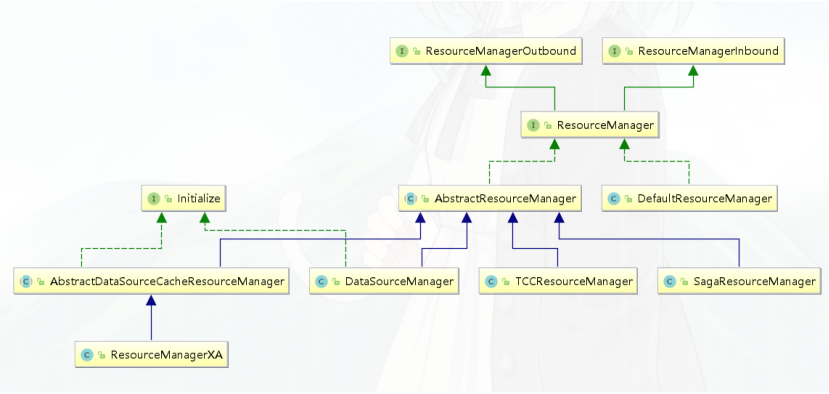
2. 核心接口和类

ResourceManager

ResourceManager是seata的重要组件之一，RM负责管理分支数据资源的事务。

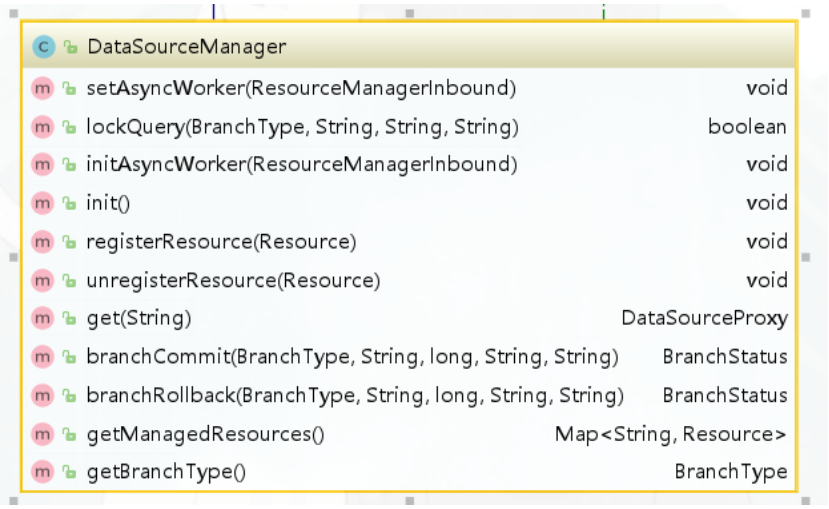


AbstractResourceManager实现ResourceManager提供模板方法。DefaultResourceManager适配所有的ResourceManager，所有方法调用都委派给对应负责的ResourceManager处理。



DataSourceManager

此为AT模式核心管理器，DataSourceManager继承AbstractResourceManager，管理数据库Resouce的注册，提交以及回滚等

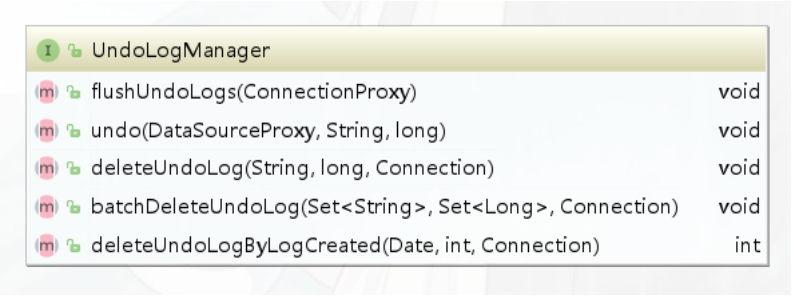


AsyncWorker

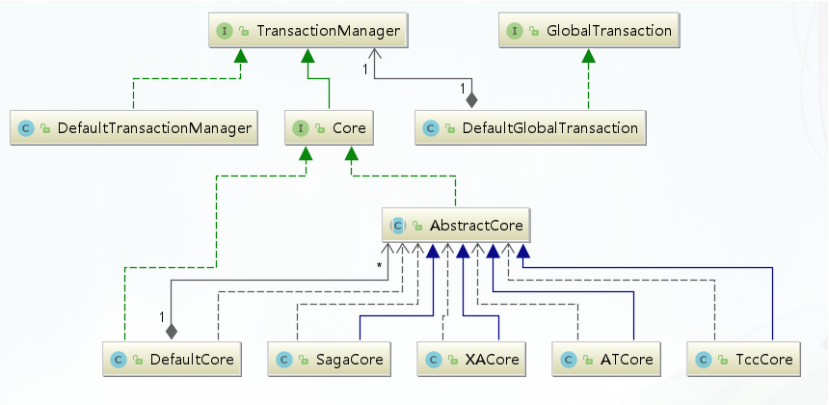
DataSourceManager事务提交委派给AsyncWorker进行提交的，因为都成功了，无需回滚成功的数据，只需要删除生成的操作日志就行，采用异步方式，提高效率。

```
AsyncWorker#doBranchCommits
> UndoLogManagerFactory.getUndoLogManager(dataSourceProxy.getDbType())
  .batchDeleteUndoLog(xids, branchIds, conn)
```

UndoLogManager

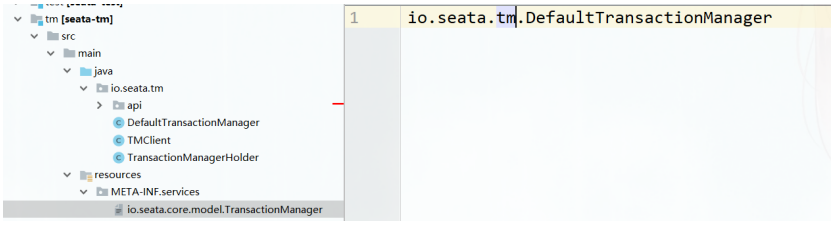


TransactionManager



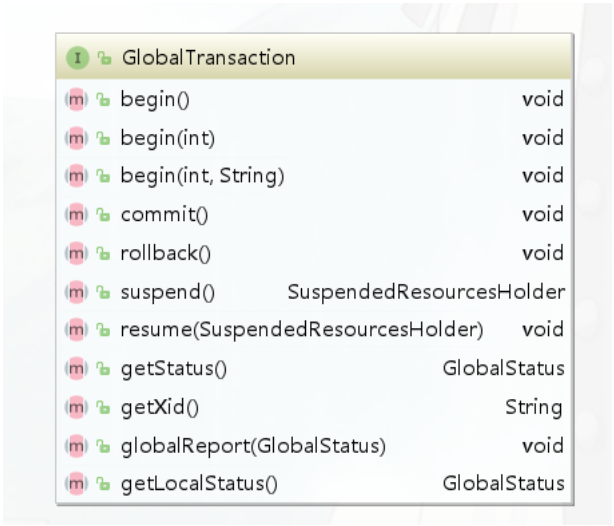
DefaultTransactionManager

TransactionManagerHolder为创建单例TransactionManager的工厂，可以使用EnhancedServiceLoader的spi机制加载用户自定义的类，默认为DefaultTransactionManager。



GlobalTransaction

GlobalTransaction接口提供给用户开启事务，提交，回滚，获取状态等方法。



DefaultGlobalTransaction

DefaultGlobalTransaction是GlobalTransaction接口的默认实现，它持有TransactionManager对象，默认开启事务超时时间为60秒，默认名称为default，因为调用者的业务方法可能多重嵌套创建多个GlobalTransaction对象开启事务方法，因此GlobalTransaction有GlobalTransactionRole角色属性，只有Launcher角色的才有开启、提交、回滚事务的权利。

GlobalTransactionContext

GlobalTransactionContext为操作GlobalTransaction的工具类，提供创建新的GlobalTransaction，获取当前线程有的GlobalTransaction等方法。

GlobalTransactionScanner

GlobalTransactionScanner继承AbstractAutoProxyCreator类，即实现了SmartInstantiationAwareBeanPostProcessor接口，会在spring容器启动初始化bean的时候，对bean进行代理操作。wrapIfNecessary为继承父类代理bean的核心方法，如果用户配置了service.disableGlobalTransaction为false属性则注解不生效直接返回，否则对GlobalTransactional或GlobalLock的方法进行拦截代理。

GlobalTransactionalInterceptor

GlobalTransactionalInterceptor实现aop的MethodInterceptor接口，对有@GlobalTransactional或GlobalLock注解的方法进行代理。

TransactionalTemplate

TransactionalTemplate模板类提供了一个开启事务，执行业务，成功提交和失败回滚的模板方法execute(TransactionalExecutor business)。

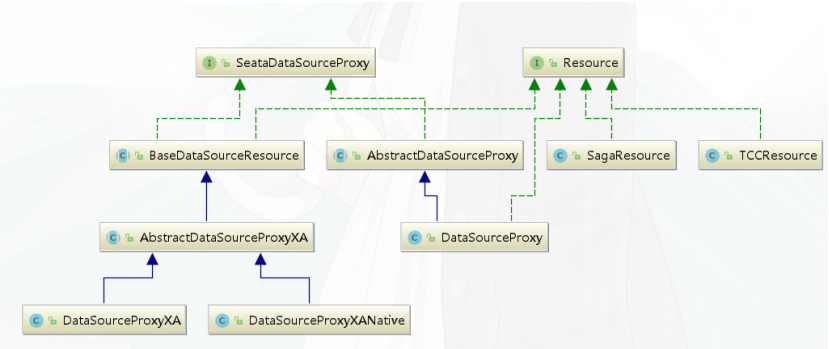
```
try {
    // 2. If the tx role is 'GlobalTransactionRole.Launcher', sen
ransaction to TC,
    //    else do nothing. Of course, the hooks will still be tri
    beginTransaction(txInfo, tx);

    Object rs;
    try {
        // Do Your Business
        rs = business.execute();
    } catch (Throwable ex) {
        // 3. The needed business exception to rollback.
        completeTransactionAfterThrowing(txInfo, tx, ex);
        throw ex;
    }

    // 4. everything is fine, commit.
    commitTransaction(tx);
```

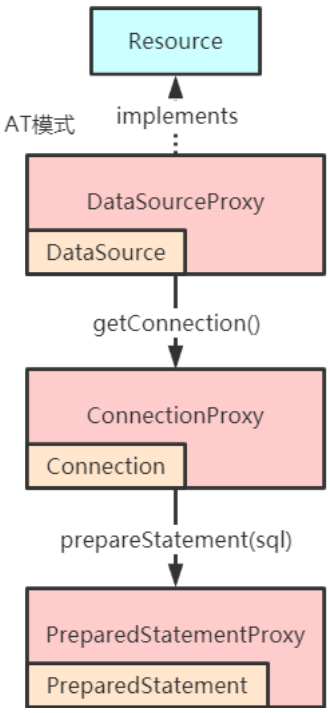
Resource

Resource能被ResourceManager管理并且能够关联GlobalTransaction。



DataSourceProxy

DataSourceProxy实现Resource接口，BranchType为AT自动模式。它继承AbstractDataSourceProxy代理类，所有的DataSource相关的方法调用传入的targetDataSource代理类的方法，除了创建connection方法为创建ConnectionProxy代理类。对象初始化时获取连接的jdbcUrl作为resourceId,并注册至DefaultResourceManager进行管理。同时还提供获取原始连接不被代理的getPlainConnection方法。



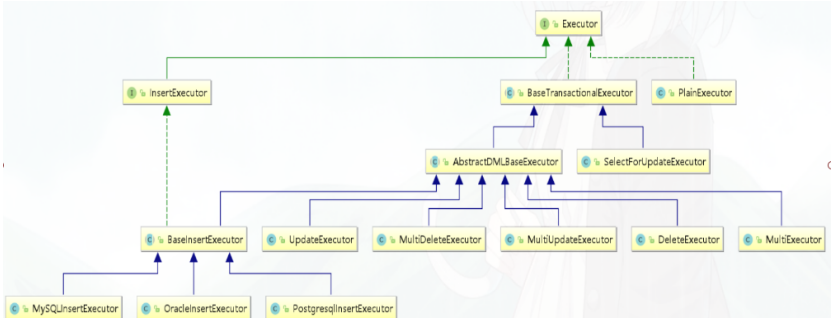
ConnectionProxy

```
private void doCommit() throws SQLException {
 if (context.inGlobalTransaction()) {
 processGlobalTransactionCommit();
 } else if (context.isGlobalLockRequire()) {
 processLocalCommitWithGlobalLocks();
 } else {
 targetConnection.commit();
 }
}
private void processGlobalTransactionCommit() throws SQLException {
 try {
 register();
 } catch (TransactionException e) {
 recognizeLockKeyConflictException(e, context.buildLockKeys());
 }
 try {
 UndoLogManagerFactory.getUndoLogManager(this.getDbType()).flushUndoLogs(this);
 targetConnection.commit();
 } catch (Throwable ex) {
 LOGGER.error("process connectionProxy commit error: {}", ex.getMessage(), ex);
 report(false);
 throw new SQLException(ex);
 }
 if (IS_REPORT_SUCCESS_ENABLE) {
 report(true);
 }
 context.reset();
}
```

ExecuteTemplate

ExecuteTemplate为具体statement的execute，executeQuery和executeUpdate执行提供模板方法

Executor



SQLRecognizer

SQLRecognizer识别sql类型，获取表名，表别名以及原生sql

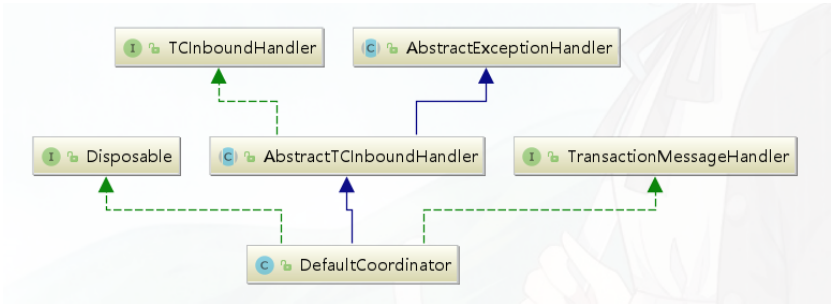
UndoExecutorFactory

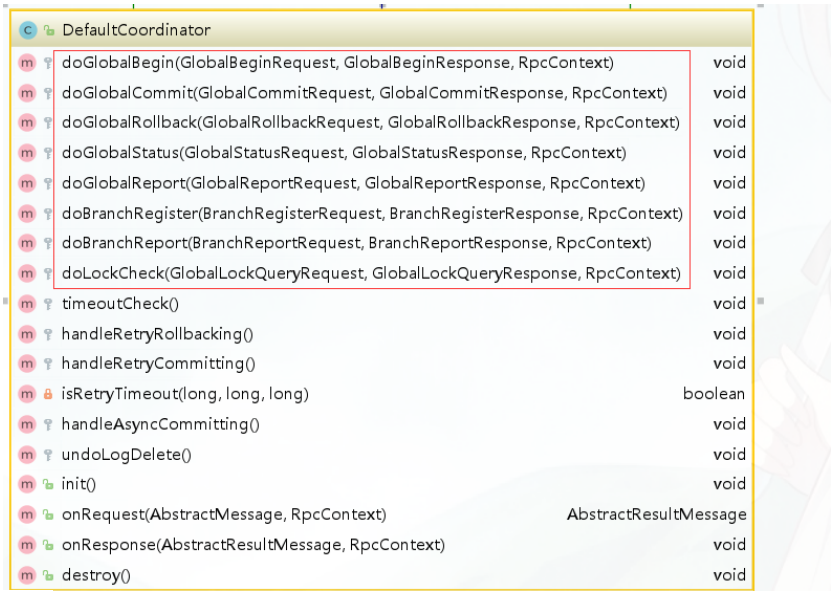
UndoExecutorFactory根据sqlType生成对应的AbstractUndoExecutor。

UndoExecutor为生成执行undoSql的核心。如果全局事务回滚，它会根据beforeImage和afterImage以及sql类型生成对应的反向sql执行回滚数据，并添加脏数据校验机制，使回滚数据更加可靠。

DefaultCoordinator

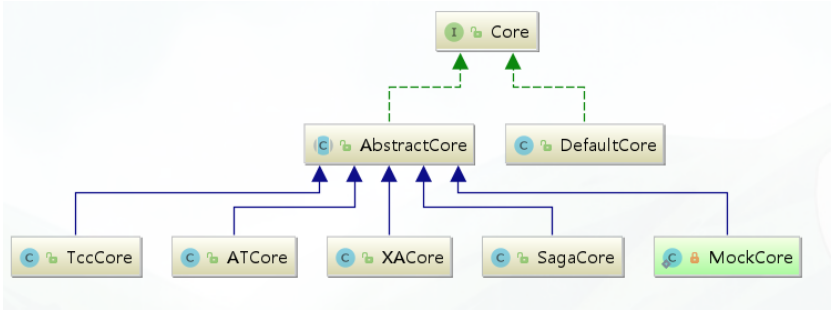
DefaultCoordinator即为TC，全局事务默认的事务协调器。它继承AbstractTCInboundHandler接口，为TC接收RM和TM的request请求数据，是进行相应处理的处理器。实现TransactionMessageHandler接口，去处理收到的RPC信息。实现ResourceManagerInbound接口，发送至RM的branchCommit，branchRollback请求。

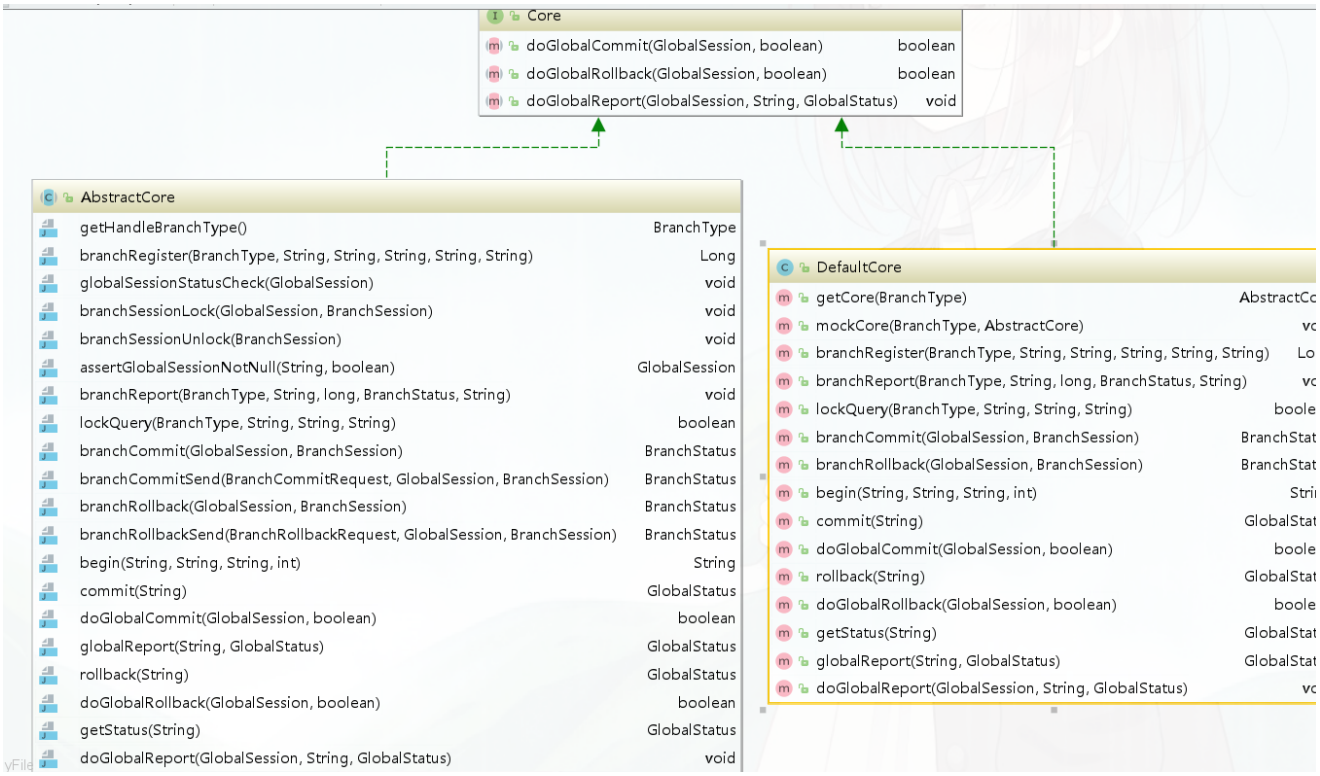




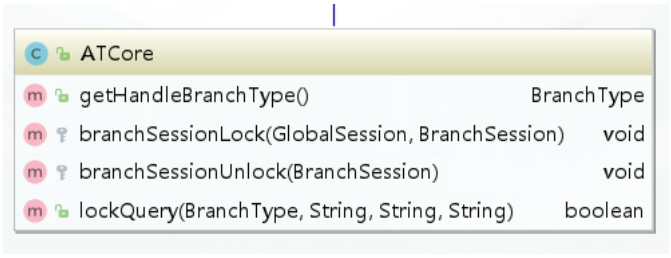
Core

Core接口为seata处理全球事务协调器TC的核心处理器，它继承ResourceManagerOutbound接口，接受来自RM的rpc网络请求（branchRegister，branchReport，lockQuery）。同时继承TransactionManager接口，接受来自TM的rpc网络请求（begin，commit,rollback,getStatus），另外提供提供3个接口方法。





ATCore



GlobalSession

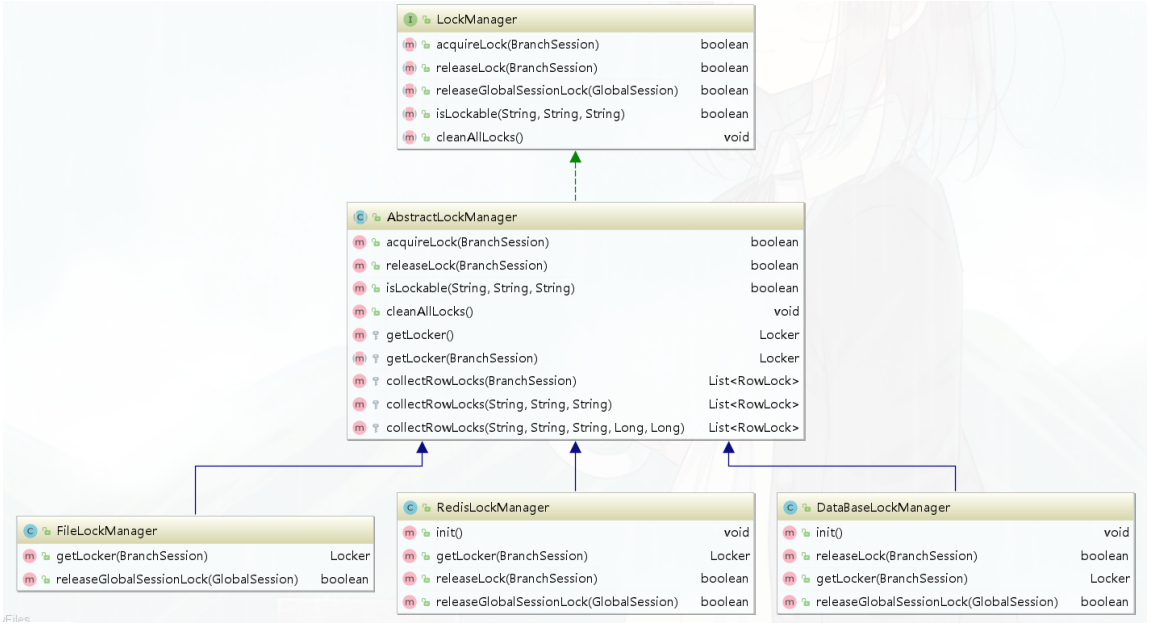
GlobalSession是seata协调器DefaultCoordinator管理维护的重要部件，当用户开启全局分布式事务，TM调用begin方法请求至TC，TC则创建GlobalSession实例对象，返回唯一的xid。它实现SessionLifecycle接口，提供begin，changeStatus，changeBranchStatus，addBranch，removeBranch等操作session和branchSession的方法。

BranchSession

BranchSession为分支session，管理分支数据，受globalSession统一调度管理，它的lock和unlock方法由lockManger实现。

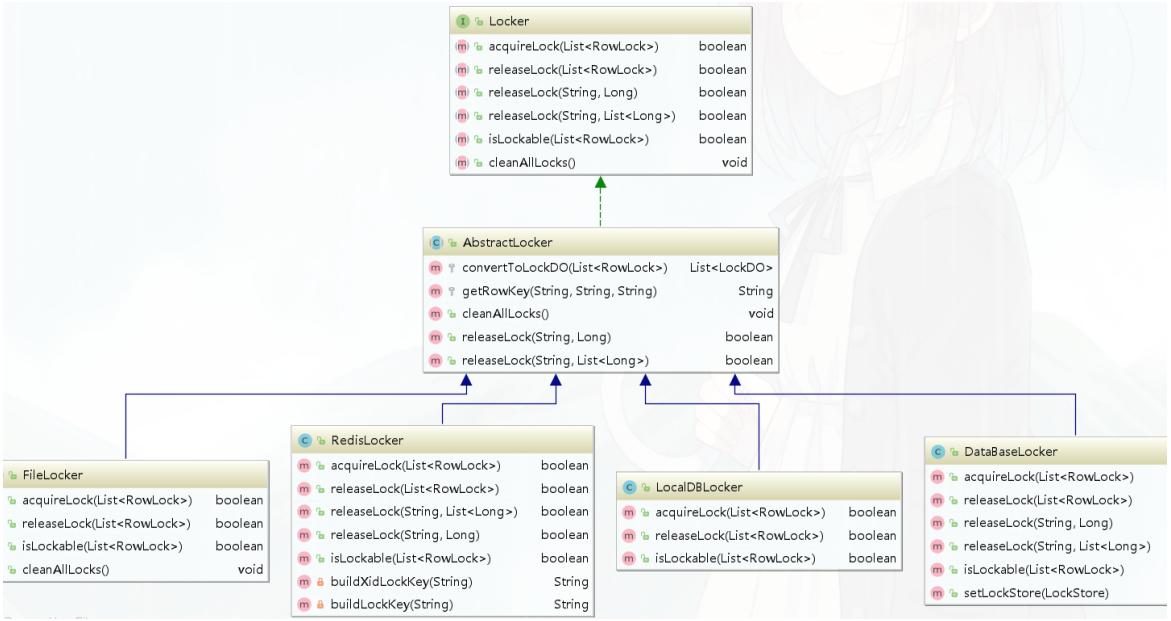
LockManager

DefaultLockManager是LockManager的默认实现，它获取branchSession的lockKey，转换成List<RowLock>，委派Locker进行处理。



Locker

Locker接口提供根据行数据获取锁，释放锁，是否锁住和清除所有锁的方法。



3. 源码分析

https://www.processon.com/view/link/6007f5c00791294a0e9b611a

https://www.processon.com/view/link/5f743063e0b34d0711f001d2

文档：15 分布式事务Seata源码分析.note

链接：http://note.youdao.com/noteshare?id=7972fda144e854364f6b06d02d40c4c3&sub=97B186CD3BCA42E7807B05A162318CA5