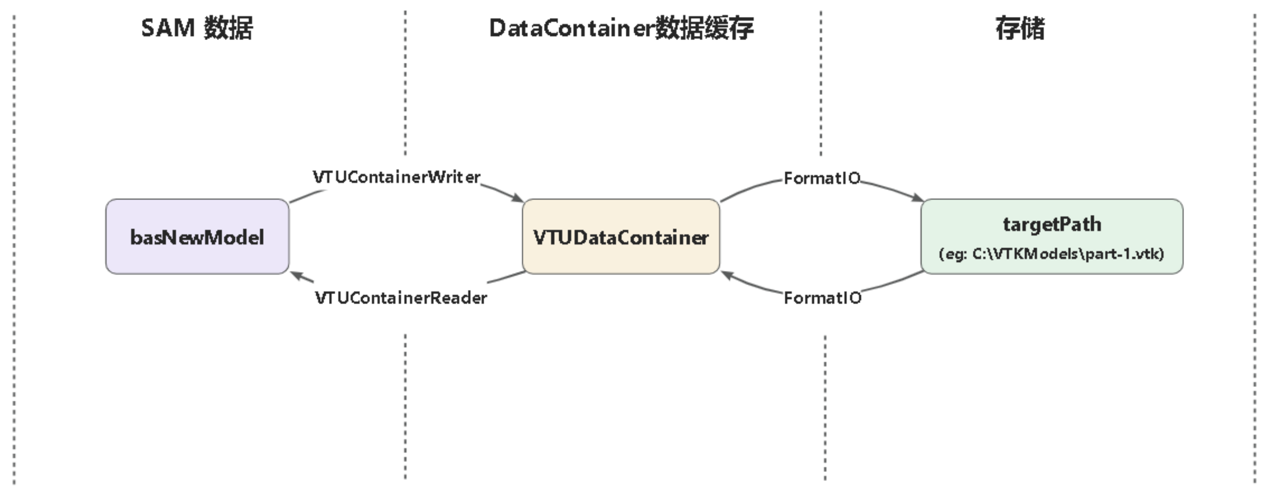
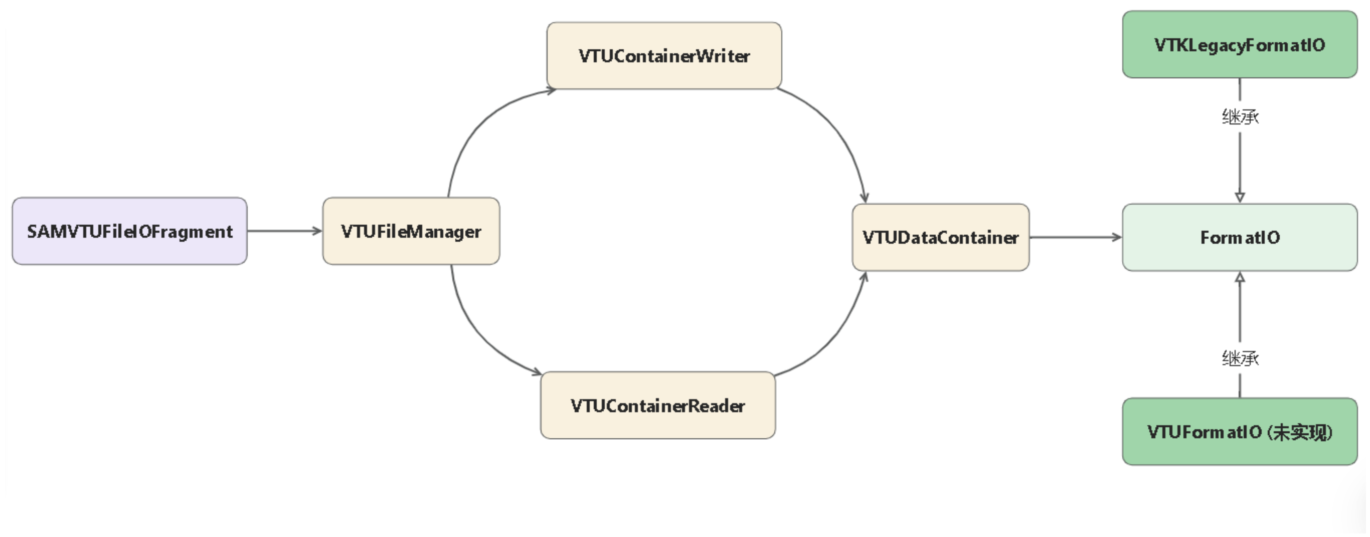
VTKFileIO详细设计

模块功能说明

数据流视图



类视图



类文件说明

- **VTKFileIO**
  - SAMVTKFileIOFragment
    ptsKModelFragment 继承类，接收 Gui 端发出的的 VTK 读写命令。
  - VTUElementHandler
    定义 SAM 单元类型与 VTK 单元类型的转换，定义单元对应的顶点数据长度。
  - VTUFileManager
    数据中转站，调用方法将 SAM 或 VTK 数据转换为 DataContainer。

- VTUDataContainer
  缓存中转数据。
- VTUContainerWriter
  将 SAM 数据写入 DataContainer 数据缓存类的方法。
- VTUContainerReader
  将 DataContainer 数据读入 SAM 的方法。
- FormatIO
  DataContainer 缓存数据写入存储和从存储读出的模板类。
- VTKLegacyFormatIO
  FormatIO 的继承类，实现 VTK Legacy 文件的读写方法。
- MessageHandler
  负责向 Message 消息窗口发送模块工作状态信息，包括报错已经导入导出时读取到的节点、单元数量
- VTUFileIOPytMoudle
- VTUIOUtils

Export 导出功能详细设计

Export Classes View

模块的主要功能包括：

- 菜单栏按钮插入，在`VTKFileIOToolset`实现：

```
//VTKFileIOToolset.cpp

SAMMenuCommand* exportVTKCmd = new SAMMenuCommand(this, fileMenu, tr("&VTK
Legacy.."));
testMenu->addAction(exportVTKCmd);
```

- 读取输出位置、场景(**Part**、**Assembly**、**Visualization**)以及模型名字等，确定数据输出范围。在不同视图下输出VTK文件包含的内容如下表：

场景	输出范围
Part	**Part**
Assembly	所有**Part**
Visualization	所有**Part** + 后处理数据

```
//VTUFileIOCommand.cpp
const sesGVpContext& context = sesGSessionState::Instance()-
>ConstGetVpContext();

omuArguments args(4);
args.Put(path);
args.Put((int)(context.TypeByModule()));
args.Put(context.ModelName());
args.Put(context.PartName());

//VTUFileManager.cpp
//区分场景输出对应文件
int VTUFileManager::WriteCache() {
    writer = new VTUContainerWriter();
    switch (target.displayMode) {
        case omu_PART: {
            return writeSinglePart();
        }
        case omu_ASSEMBLY: {
            return writeAllParts();
        }
        case omu_ODB: {
            return writeODB();
        }
    }
    return ERRORTYPE_WRONG_SCENE;
}
```

- 读取点和单元数据:

```
int VTUFileWriter::GetVTKPart(){
    ftrFeatureList* flpart = part.GetFeatureList();
    const bmeMesh* objectMesh = flpart->ConstGetMesh(bdoDefaultInstId);
    const bmeNodeData& nodeData = objectMesh->NodeData();
}
```

- 定义 SAM 单元类型和 VTK 单元类型的转换

```
//VTUElementHandler.h
class VTUElementHandler
{
public:
    static enum VTKType {
        VTK_NONE,
        VTK_VERTEX,
        VTK_POLYVERTEX,
        VTK_LINE,
        VTK_POLY_LINE,
        VTK_TRIANGLE,
        VTK_TRIANGLE_STRIP,
        VTK_POLYGON,
        VTK_PIXEL,
        VTK_QUAD,
        VTK_TETRA,
        VTK_VOXEL,
        VTK_HEXAHEDRON
    };

public:
    static VTKType SimplifiedConvertor(const QString& typeLabel, int
dimension);

    static VTKType ConvertTo1DVTKType(const QString& typeLabel);

    static VTKType SimplyConvertTo1DVTKType(const QString& typeLabel);
    static VTKType SimplyConvertTo2DVTKType(const QString& typeLabel);
    static VTKType SimplyConvertTo3DVTKType(const QString& typeLabel);

    static bool Check3DVTKType(VTUElementHandler::VTKType type);

    static int GetArrayLengthByLabel(const QString& typeLabel);
    static int GetArrayLengthByEnum(VTKType typeEnum);

    static QString GetSAMTypeByVTKType(VTKType typeEnum, int beamType = 0,
int cubeType = 0, int quadType = 0);
};
```

- 将转换的 SAM 数据写入缓存:

```
int VTUFileManager::WriteCache() {

writer = new VTUFormatWriter();
switch (target.displayMode) {
    case omu_PART: {
        return writeSinglePart();
    }
    case omu_ASSEMBLY: {
        return writeAllParts();
    }
    case omu_ODB: {
        return writeODB();
    }
}
return ERRORTYPE_WRONGSCENE;
}
```

- 写出VTK文件:

```
int VTKLegacyFormatWriter::Write() {
    if (!file) return ERRORTYPE_NOTEXIST;
    *stream << "# vtk DataFile Version 3.0\n";
    *stream << "SAMModel Output" << "\n";
    *stream << "ASCII\n";
    *stream << "DATASET UNSTRUCTURED_GRID\n";
    *stream << flush;
    currentState = HeaderWritten;
    currentState = WritePointsHeader();
    *stream << flush;

    currentState = WritePoints();
    *stream << flush;

    currentState = WriteCellsHeader();
    *stream << flush;

    currentState = WriteCells();
    *stream << flush;

    currentState = WriteCellTypesHeader();
    *stream << flush;

    currentState = WriteCellTypes();
    *stream << flush;

    return 0;
}
```

Import导入详细设计

Import Classes View

- 导入控制流程:

```
//SAMVTUFileIOFragment.cpp
fileManager = new VTUFileManager;
if (fileManager != NULL)
{
    fileManager->Init(path, modelName);
    if (!(status |= fileManager->ReadToCache())) {
        status |= fileManager->ReadToSAM();
    }
    if (fileManager->GetTargetPartName().isEmpty()) {
        status |= ERRORTYPE_NOTEXIST;
    }
    else{
        QString pyt = QString("session.viewports['Viewport:
1'].setValues(displayedObject =
mdb.models['%1'].parts['%2'])").arg(modelName).arg(fileManager-
>GetTargetPartName());
        if (!status)
cmdKCommandDeliveryRole::Instance().ProcessCommand(pyt);
    }
    delete fileManager;
}
```

- VTK Legacy 格式读入至数据缓存 DataContainer

```
int VTUFileManager::ReadToCache() {
    writer = new VTUContainerWriter();
    fileReader = new VTKLegacyFormatReader(target.TargetPath(), writer-
>GetContainerPointer());

    int status = fileReader->Read();

    MessageHandler::ReportImportInfo(fileReader->GetNodesRead(), fileReader-
>GetCellsRead());
    delete fileReader;

    if(status == 0) reader = new VTUContainerReader(writer-
>GetContainerPointer());

    return status;
}
```

- DataContainer 数据写入 SAM

```
//VTUFileManager.cpp
int VTUFileManager::ReadToSAM() {
    QString targetP = target.TargetPart();
    int status = reader->ConstructNewPart(target.TargetModel(), targetP,
target.targetPartID);
    //memset((void*)target.targetPart, 0, 128 * sizeof(wchar_t));
    wcsncpy(target.targetPart, reinterpret_cast<const wchar_t*>
(targetP.utf16()), targetP.size() + 1);
    //reader->ReleaseMemory();
    delete reader;
    delete writer;
    writer = NULL;
    reader = NULL;
    return status;
}

//VTUContainerReader.cpp
int VTUContainerReader::ConstructNewPart(const QString& modelName, QString&
partName, int& partID) {}
int VTUContainerReader::ConstructElemClasses(bmeElementClass*** classes,
int* numCls) {}
```