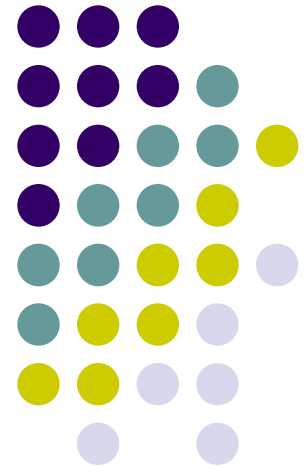


A VERSATILE CODEC LIBRARY FOR TTCN- 3

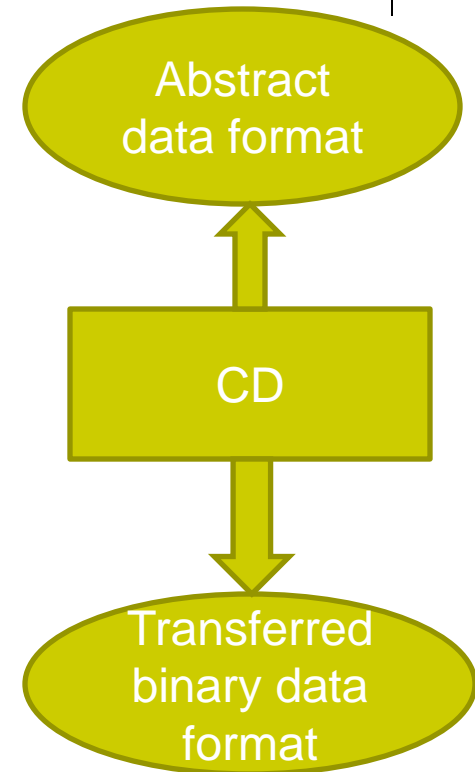
Tang Yanwu
USTC





WHAT IS CD

- TTCN-3 Codec is used to convert abstract data format with transferred binary data format.
- When develop a test system, CD development always occupies a majority part of the total work.
- Our research focuses on improving the efficiency of CD development.

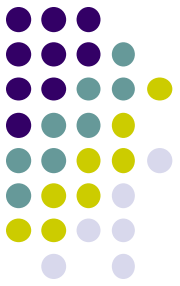


ABSTRACT DATA FORMAT



- Abstract data format
 - Could be TTCN-3, ASN.1, TSN.1, XML Schema, XML DTD, etc.
 - Except TTCN-3 and ASN.1, other data types are usually transformed to TTCN-3 when used in TTCN-3 test system





CODEC RULES

- Some common used codec rules include BER, PER, XER, TLV, HTTP, etc
- Different codec schema may be used in combination within one test , such as a xml packet contains a TLV sub-packet.



TTCN-3 CONTROL INTERFACE PROVIDED FOR CD



- TCI Limitation

- TCI Provided for CD includes:

Interface	Usage
TciModuleIdType getDefiningModule()	Get module info of the specified TCI type
TString getName()	Get name of the specified TCI type
TciTypeClassType getTypeClass()	Get type kind of the specified TCI type
Value newInstance()	Create a new value Instance of the specified TCI type
TString getTypeEncoding()	Get encode attribute of the specified TCI type
TString getTypeEncodingVariant()	Get variant attribute of the specified TCI type
TStringseq getTypeExtension()	Get extension attribute of the specified TCI type

- However, you can't straightly get some info through TCI for CD (such as subtype constraint info for packed encode rules)



CODEC MIGRATION

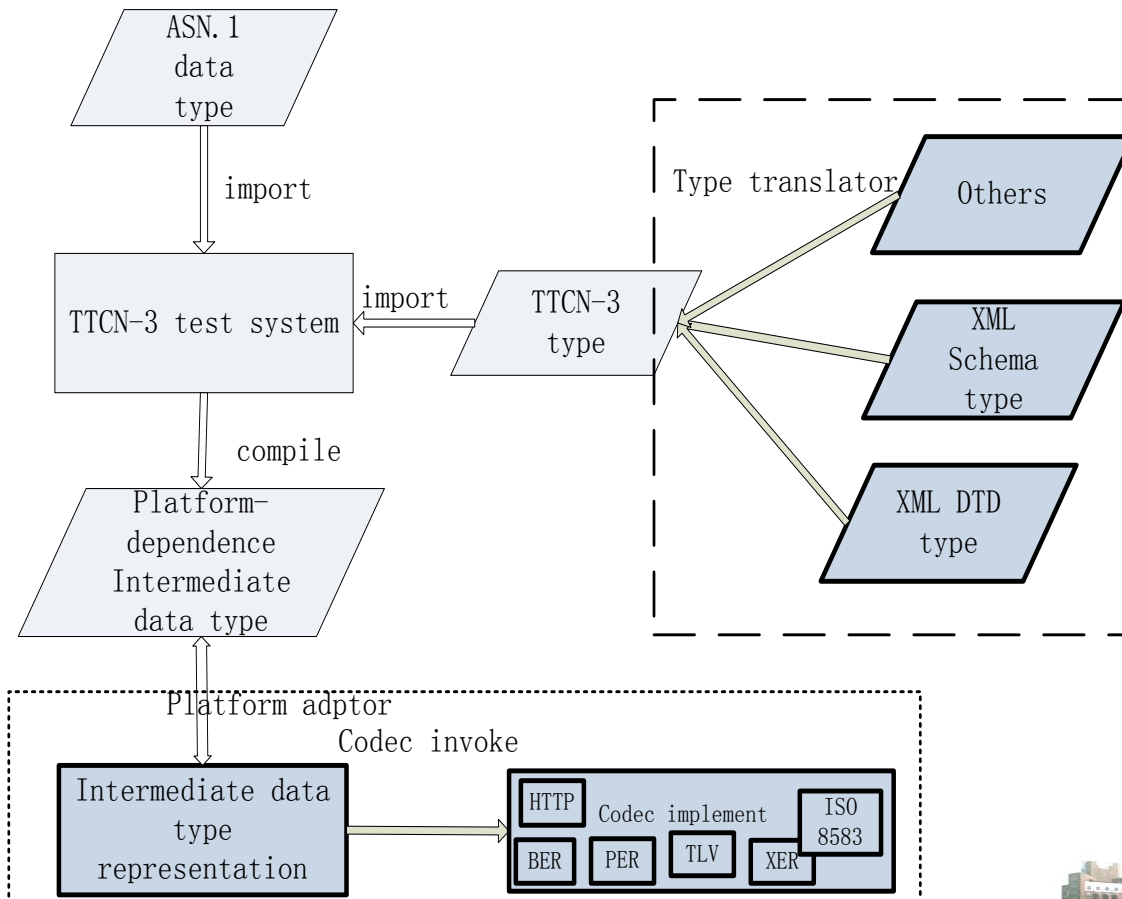


- Different TCI implementation
 - ETSI recommends three program language implements for TCI, which includes C, C++, Java. It's difficult to migrate CD implemented on one to another .





A VIEW OF VCL



- VCL includes two parts:
 - Type translator
 - Codec implement based on intermediate data type representation



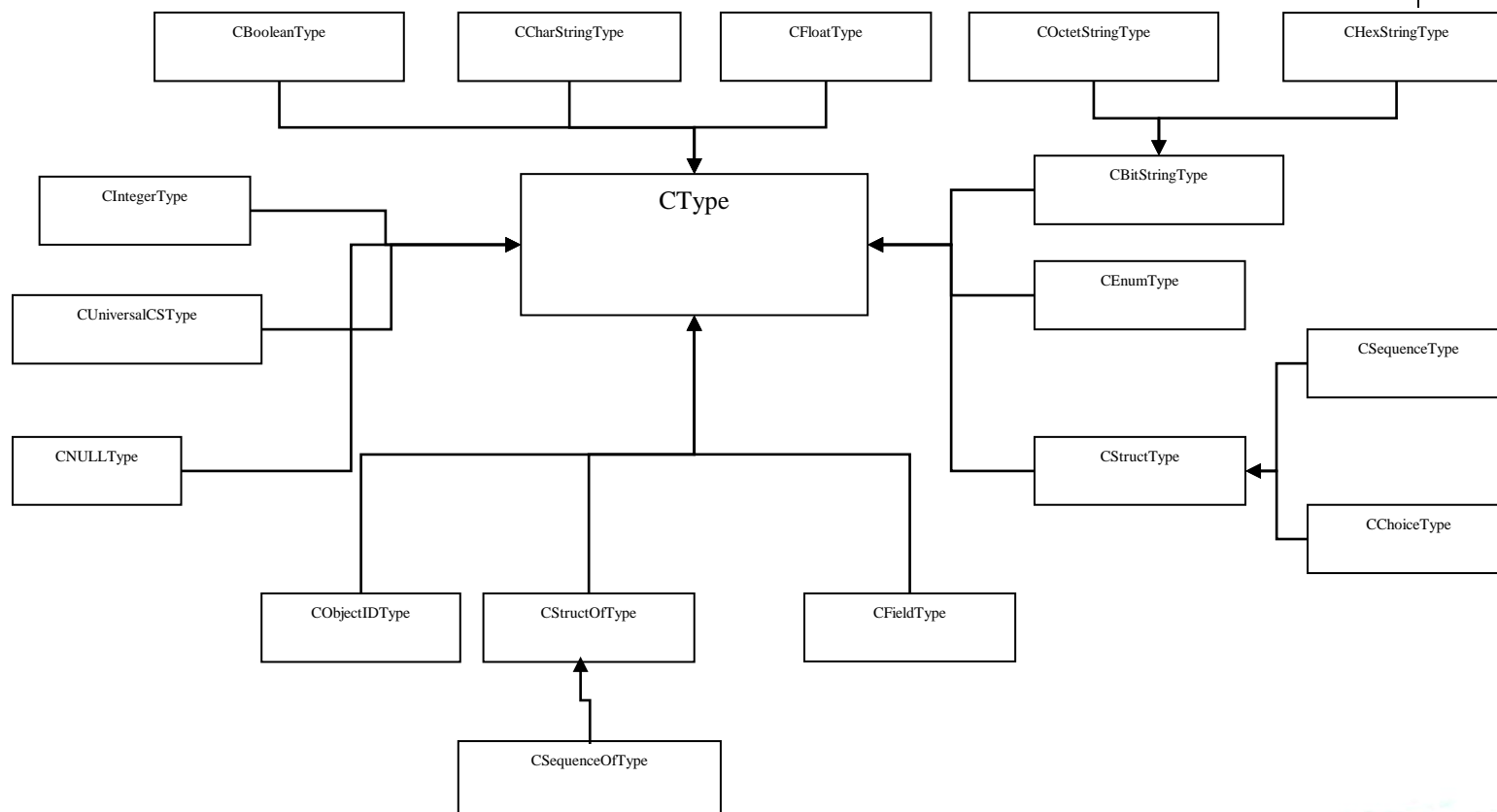
INTERMEDIATE DATA REPRESENTATION



- Intermediate data representation
 - Based on ASN.1 data type, we bring forward intermediate data representation, aim at giving a more powerful expression ability than TCI provided for codec.
 - The intermediate data representation can hold the type information such as TTCN-3, ASN.1, XML Schema, and it also support to extend for new data types in the future.



INTERMEDIATE DATA TYPE REPRESENTATION



Type hierarchy in intermediate data type representation



SUPPORT FOR EXTENSION



- The intermediate data representation also contains interfaces for extension usage
 - RegisterExtensionObj
 - GetExtensionObj
 - RemoveExtensionObj





CODEC IMPLEMENT

- The codec rules are implement based on intermediate data types, the advantage of this includes:
 - Codec development is much easier, developer only need to be familiar with the intermediate data type representation, not the specified platform data type
 - Improves the reusability of codec





CODEC IMPLEMENT

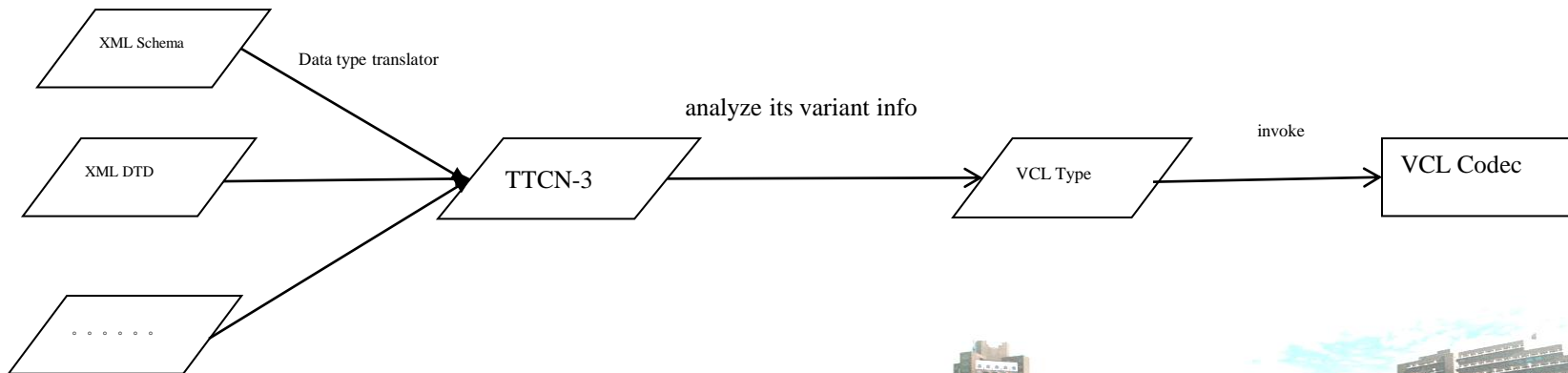
- In Versatile Codec Library, we have implemented some common encode rules includes BER, PER, XER, TLV, HTTP and so on.
- Different codec rules can be used in combination, which means that you can embed an ISO8583 packet in xml data.
- Codec rules is specified by its encode attribute and variant attribute



DATA TYPE TRANSLATOR



- Some useful information for codec may be lost after translation, so it is necessary to record that information in translated TTCN-3. Variant attribute in TTCN-3 can be used for that.



XML SCHEMA TRANSLATOR



- Based on ETSI ES 201 873-9, TTCN-3, Part 9: <Using XML schema with TTCN-3>
- Modifications:
 - Variant format
 - Anytype translation method
 - ...



XML DTD DATA TRANSLATOR



- The DTD type translation method is some like XML Schema type translation method.
- In DTD translation, entity elements in DTD are needed to resolve to its real value.





USAGE OF VCL

- We have already applied VCL to IBM's Tau Tester(C TCI) and our LoongTesting tools(C++interface TCI interface) with corresponding platform adaptor
- With VCL ,we also carry testing to china mobile's mobile payment system.



VCL CODEC SPECIFIED RULES



● Examples

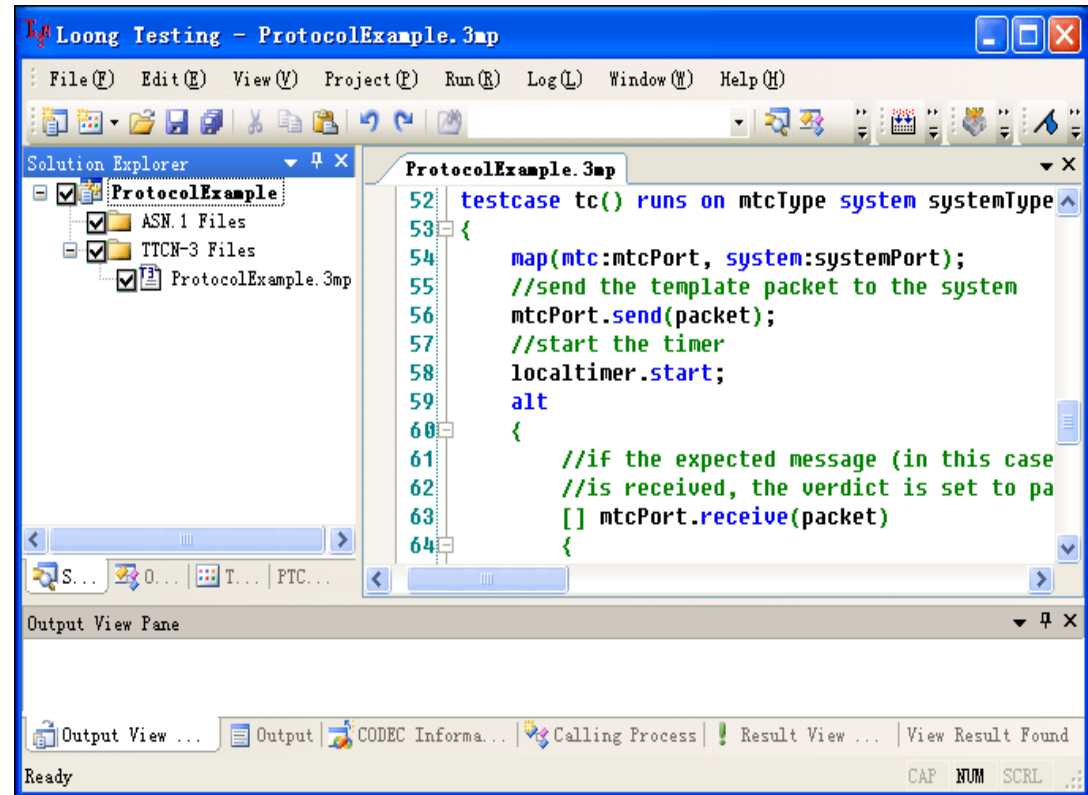
TTCN-3 type definition	Codec rules
<pre>type charstring Type1 with{encode "ASCII-LL-B-1"};</pre>	encode charstring with one byte prefix for its length
<pre>type record Type2 { int a(0..9999); charstring b; }with { encode"XER_GBK" encode(a)"BCD-2" encode(b)"ASCII-12" variant(a)"Name'b"}</pre>	Encode Type2 with XER; encode(a)"BCD-2" stands for encode field a with BCD rules in 2 bytes; variant(a)"Name'b" stands for field b is encode with name a in XER;



LOONG TESTING



- TTCN-3 compile and execute platform
- Meet ETSI standards
- Support ASN.1 importing
- Support GFT feature
- Easy-to-use
- Open source





NEXT WORK(1)

- Test as a service
 - We plan to implement compiling, executing, controlling, logging functions of TTCN-3 test system as web services
- Easy-to-use system adaptor
 - We plan to implement a system adaptor with high configurability to make writing system adaptor much easier in LoongTesting.



NEXT WORK(2)

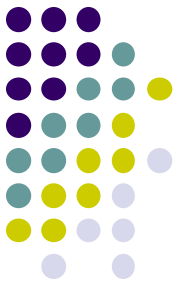


- Others
 - Automatic generate test input
 - Integrate with other tools
 - ...

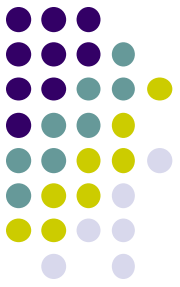


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● Thanks



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