

PURPOSE

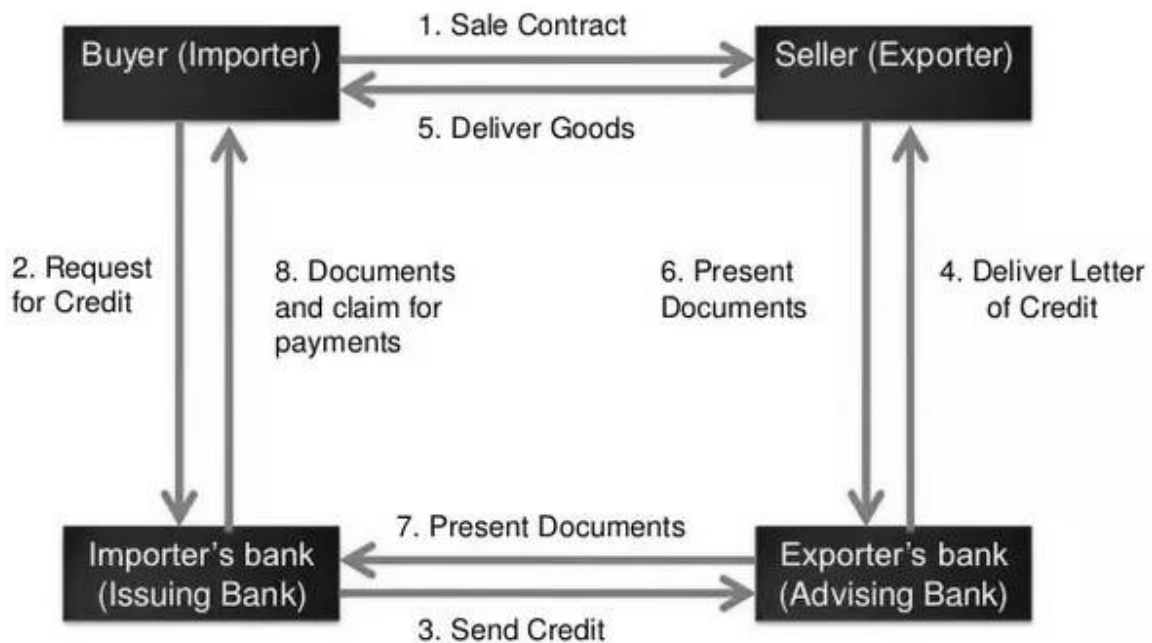
This document details a Proof of Concept (POC) for implementing a Decentralized Trade Finance Scenario using Corda DLT.

ACTORS

1. **BUYER** - Who intends to buy the goods
2. **SELLER** - Who offers the goods for sale
3. **BUYERS BANK** - Buyer has account with this bank and Letter of Credit (LC) is opened by this bank. Also known as Issuing Bank
4. **SELLERS BANK** - Seller deals with this bank and LC is verified by this bank. Also known as Advising Bank.
5. **Carrier** – Shipping Agent is the carrier of goods from Sellers port to Buyers port
6. **USDA** - Agency which does the Phyto Certification for the goods that is being sold.

WORKFLOW

1. **Sale Agreement.**
2. **Letter of Credit.**
3. **Phyto Certification.**
4. **Bill of Lading.**



1. SALE AGREEMENT

An agreement of sale is executed by the buyer and seller. For brevity we are skipping all the processes prior to sale agreement like, Letter of Intent, Expression of Interest, Invoice, Purchase Order etc. The only parties to the sale agreement are Buyer and Seller. Following parameters define a typical sale agreement in this context.

Sale Agreement

```

{
  "SaleAgreementNo" : "SA1234",
  "Buyer" : "FutureGroup",
  "Seller" : "ADL",
  "BuyerCountry" : "India",
  "SellerCountry" : "USA",
  "CountryOfNotary" : "Germany",
  "NotorizedBy" : "ABC GmBH",
  "ItemOfSale" : "Hazel Nut",
  "QuantityOfSale" : "500 MT",
  "SaleAmount" : "50000 USD",
  "AgreementDate" : "01/01/2018"
  "State": "Triggered",
}
  
```

Corda Parties – **Buyer** and **Seller**.

Potential State changes for Sale Agreement – **Triggered**, **Verified**, and **Notarised**.

2. Letter of Credit.

Once the sale Agreement is verified and notarised by the participating parties, the Buyer initiates the request for letter of credit (LC) to Buyers Bank. Based on the credit worthiness of the buyer, genuineness of the Sale Agreement etc, Buyer's Bank issues the letter of credit to Sellers Bank. Sellers Bank verifies the LC and pass it on to the seller.

LC will have the following format.

Letter of Credit

```
{  
  "LCNumber" : LC1234,  
  "LCType" : "Revokable",  
  "LCDate" : "01/01/2018",  
  "LCApplicant" : "FutureGroup",  
  "LCBeneficiary" : "ADL Corp",  
  "IssuingBank" : "SBI",  
  "AdvisingBank" : "Bank of America",  
  "DescriptionOfGoods" : " 500 MT First grade Hazel Nut",  
  "LCAmount" : "50000 USD",  
  "LCExpiry" : "01/01/2019",  
  "State": "Requested"  
}
```

Corda Parties – **Buyer** and **Seller**, **Issuing Bank** and **Advising Bank**

Potential State changes for LC – **Requested**, **Created**, **Verified**, and **Accepted**.

Key constraint – Only participating parties has access to any contract/state data. Sale Agreement is an input for LC flow, but sanctity and confidentiality of the sale agreement needs to be maintained.

3. Phyto Certification.

Seller has to comply with food safety regulations and the Shipping agency will accept goods only if it is certified by USDA. Seller arranges for inspection and get the Phyto certification before submitting the goods for shipment.

Phyto Certification request will be represented in our system as below.

Phyto Certification Request

```
{  
  "CertificateNo" : PHC1234,  
  "Buyer" : "FutureGroup",
```

```
"Seller" : "ADL",
"CertifyingAuthority" : "USDA",
"ComodityName" : "Hazel Nut",
"CountryOfOrigin" : "USA",
"CuntryOfExport" : "India",
"DateOfInspection" : "02/02/2018",
"ShippingBillNo" : "SCN1234"
"State" : "Requested",
"LCNumber" : "LC1234",
```

```
}
```

Corba Parties – **Seller** and **USDA**

Potential State changes for LC – **Requested, Approved, and Rejected.**

Same constraint mentioned in the case of LC applies here also. LCNumber is an input state, But USDA should not be given access to the entire LC state, any flow on Phyto Certification Request just need to ensure that LCNumber supplied is genuine.

4. Bill of Lading.

Bill of Lading is a sacred document and anyone who is in possession of BL can claim the goods from Customs at the port of unloading. BL is issued by the shipping agency within stipulated time of shipment leaving the port of Origin, either to the seller or sellers bank directly. Sellers Bank despatches the BL to the Buyers Bank and Buyer take the possession of BL by making the payment to his Bank.

For the context of our POC, we will use the below format for BL.

```
BL
{
"BLNumber" : "BL1234",
"Consignor" : "ADL Corp",
"Consignee" : "FutureGroup",
"Carrier": "EMU Lines",
"PhytoCertNo" : "PH1234",
"IssuingBank" : "SBI",
"AdvisingBank" : "Bank of America",
"PlaceOfAcceptance" : "Mumbai",
"Vessel" : "ITAL Modena",
"PortOfLoading" : "Perl Harbour",
"PortOfDisCharge" : "Mumbai",
"State" : "Issued"
}
```

Corda Parties – **Carrier, AdvisingBank, Issuing Bank** and **Buyer**

Potential State changes for BL – **Issued, Despatched, Received** and **Accepted**.

Same constraint mentioned in the case of LC and Phyto certificate applies here also. PhytoCertNo is an input state, But Carrier should not be given access to its state, any flow on BL Request just need to ensure that Certification Number supplied is genuine.

Breakdown of State Transition for Each of the Workflow Elements

1. SALE AGREEMENT

Sale Agreement is created by Buyer. Seller verifies it. Once it is verified by the Seller Buyer changes it to Notarised state.

Corda Flows are

1. SACreationFlow – Triggered by the **Buyer**.
2. SAVerificationFlow – By the **Seller**.
3. SANotarisationFlow – By the **Buyer**. (Buyer is acting as proxy to the notary. just want to reduce the number of participating nodes, to reduce the load on the demo virtual machine.)

Sale Agreement

```
{  
    "SaleAgreementNo" : SA1234,  
    "Buyer" : "FutureGroup",  
    "Seller" : "ADL",  
    "BuyerCountry" : "India",  
    "SellerCountry" : "USA",  
    "CountryOfNotary" : "Germany",  
    "NotorizedBy" : "ABC GmBH",  
    "ItemOfSale" : "Hazel Nut",  
    "QuantityOfSale" : "500 MT",  
    "SaleAmount" : "50000 USD",  
    "AgreementDate" : "01/01/2018"  
    "State": "Triggered",  
}
```

}

Actors: **Buyer -> Seller ->Buyer**

Sale Agreement State Changes form **Triggered -> Verified ->Notarised**.

2. LC

LC request is triggered by the Buyer. Sale Agreement Number and State are the input state for LC.

Buyers bank creates the LC on verifying the input state. Sellers bank verifies the LC and Seller Accepts the LC.

Potential Corda flows are:-

1. LCRequestFlow
2. LCCreationFlow
3. LCVerificationFlow
4. LCAcceptanceFlow

Actors: **Buyer -> Issuing Bank -> Advising Bank -> Seller**

States: **Requested ->Created->Verified->Accepted**

Letter of Credit

```
{
    "LCNumber" : LC1234,
    "LCType" : "Revokable",
    "LCDate" : "01/01/2018",
    "LCApplicant" : "FutureGroup",
    "LCBeneficiary" : "ADL Corp",
    "IssuingBank" : "SBI",
    "AdvisingBank" : "Bank of America",
    "DescriptionOfGoods" : " 500 MT First grade Hazel Nut",
    "LCAmount" : "50000 USD",
    "LCExpiry" : "01/01/2019",
    "State": "Requested"
}
```

3. Phyto Certificate

Certificate request is triggered by the Buyer on accepting the LC. Certifying Agency issues the certificate on verifying the LC state and inspection report. For the brevity inspection report flow is omitted.

Potential corda flows are

1. CertificateRequestFlow
2. CertificateAcceptanceFlow

Actors: **Seller -> USDA**

States: **Requested ->Approved**

Phyto Certification Request

```
{
```

```

"CertificateNo" : "PHC1234",
"Buyer" : "FutureGroup",
"Seller" : "ADL",
"CertifyingAuthority" : "USDA",
"CommodityName" : "Hazel Nut",
"CountryOfOrigin" : "USA",
"CuntryOfExport" : "India",
"DateOfInspection" : "02/02/2018",
"ShippingBillNo" : "SCN1234"
"State" : "Requested",
"LCNumber" : "LC1234",

}

```

4. BL

BL request is triggered by Seller to the Shipping agency and Phyto Certificate number and state are the input state to BL. Shipping Agency should not be having access to rest of the certificate state details.

Potential Corda flows are

1. BLRequestFlow
2. BLIssueFlow
3. BLDespatchFlow
4. BLAcceptedFlow

```

BL
{
"BLNumber" : "BL1234",
"Consignor" : "ADL Corp",
"Consignee" : " FutureGroup ",
"Carrier": "EMU Lines",
"PhytoCertNo" : "PH1234",
"IssuingBank" : "SBI",
"AdvisingBank" : "Bank of America",
"PlaceOfAcceptance" : "Mumbai",
"Vessel" : "ITAL Modena",
"PortOfLoading" : "Perl Harbour",
"PortOfDisCharge" : "Mumbai",
"State" : "Issued"
}

```

Actors: **Buyer -> Carrier -> Advising Bank -> Issuing Bank -> Seller**

States: **Requested ->Issued->Despatched->Accepted**

DEMO STORY – CORDA FLOW SEQUENCE

Following is the demo story corda flow sequence. Start with Buyer and seller entering into SA, then triggering the LC flow, subsequently PhytoCertificate request and then the BL flow.

1. SACreationFlow
2. SAVerificationFlow
3. SANotarisationFlow
4. LCRequestFlow
5. LCCreationFlow
6. LCVerificationFlow
7. LCAcceptanceFlow
8. CertificateRequestFlow
9. CertificateAcceptanceFlow
10. BLRequestFlow
11. BLIssueFlow
12. BLDespatchFlow
13. BLAcceptedFlow