An Innovative Hyperledger Fabric™ Blockchain to Eliminate Fraud from Philanthropic Giving

2018 ECC Conference at Marist College

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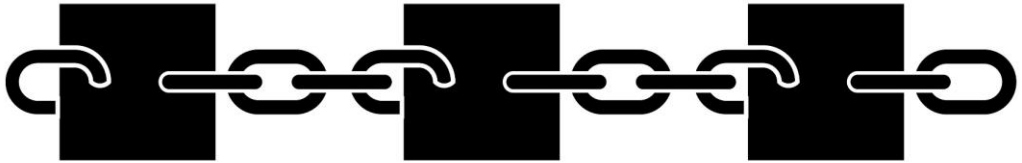
What is Blockchain?

- A digital, immutable ledger in which transactions are recorded and stored in a “block”
- Each “block” is secure, reliable, and permanent
- The hash of a “previous block” is stored in the “new block”
- Peers must agree



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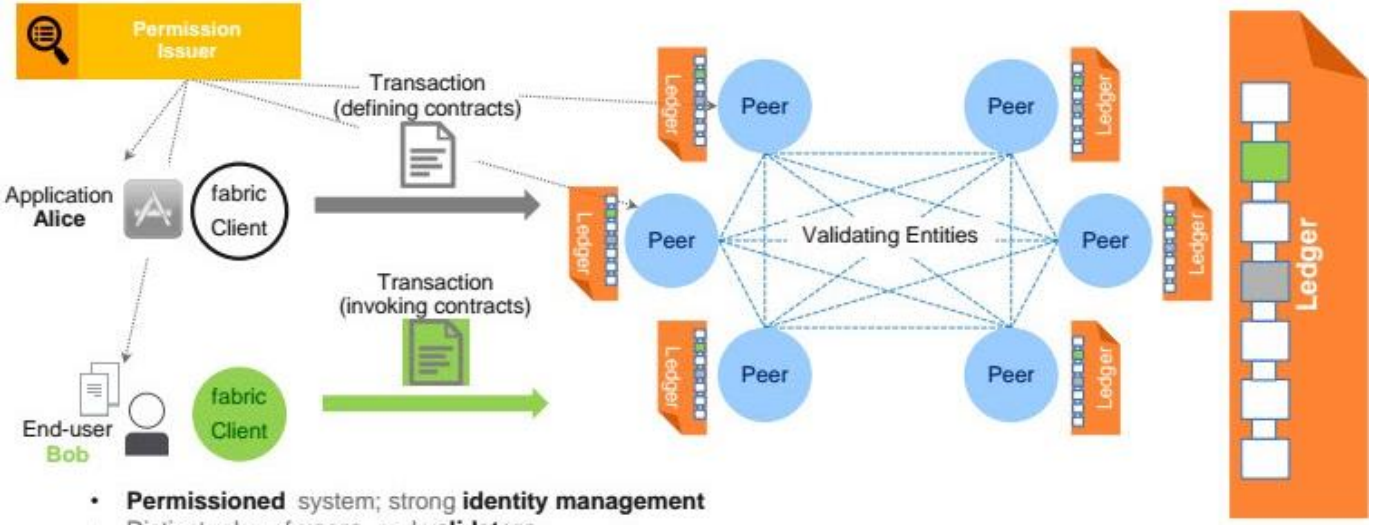
What is Hyperledger Fabric Blockchain?



- **Permissioned** system; strong **identity management**
- Distinct roles of **users**, and **validators**
- Users **deploy** new pieces of code (chaincodes) and **invoke** them through **deploy** & **invoke** transactions
- Validators evaluate the effect of a transaction and reach consensus over the new version of the **ledger**
- **Ledger** = total order of transactions + hash (global state)
- **Pluggable consensus** protocol, currently PBFT & Sieve

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What is IBM Blockchain Platform?

IBM Blockchain Images

IBM Blockchain Docker images are based on Hyperledger Fabric v1.0 with a number of enhancements for serviceability. These images also benefit from a complete series of tests for functionality, stability, and performance across the following supported system platforms: z Systems and LinuxONE (s390), Power (ppc64le), and x86.

IBM Technical Support

Technical support may be purchased only when using the IBM Blockchain images available from the IBM Blockchain Docker Hub repo. Support will not be provided for images that have been altered.

Special Thanks to Greg Lacey of IBM who got us the help we needed when we needed it.

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Who is Vicom Infinity ?

Vicom Infinity, Inc. is a Premier IBM Premier Business Partner supplying mainframe computer equipment, computer storage equipment, and associated software products. We also provide a full-spectrum of hardware- and software-related services including, but not limited to, consultation, education, installation, implementation, and migration as well as IT consulting that specializes in assisting customers in projects that exploit their past investments in IBM Z and Storage systems products.

At Vicom Infinity, our philosophy for transforming IT functionality is simple: *combine proven technology with the infinite possibilities of innovative thinking.* The results are powerful systems, based on IBM® Z mainframe servers, that fully integrate with critical business applications. These systems serve as a solid foundation for just about any application, including the ever-increasing demands of the Digital Business.

Our expertise in providing processing solutions for high-availability environments ensures we succeed at a primary objective: to develop each IT transformation seamlessly, with no impact on our clients' continued production and established workloads. Everything we do — from systems analysis to custom installations, through knowledge transfer — supports that objective.

Yongkook (Alex) Kim of Vicom Infinity helped us to get the IBM Blockchain Images running which accelerated the project. This paves the way for us to move forward to the IBM LinuxONE (z Systems)

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How is that applied to this application?

- Uses Hyperledger Fabric and Composer to create a reliable, secure way for Foundations to give grants to Non-Profits
- Both the Trustee and the Non-Profit must verify work complete before the Foundation can send the grant
- Every step of the processes recorded in permanent blocks

Date, Time	Entry Type	Participant	
2018-02-21, 14:27:25	Approve	0000 (Foundation)	view record
2018-02-21, 14:26:56	Send	0000 (Charity)	view record
2018-02-21, 14:26:34	Sign	0000 (Charity)	view record
2018-02-21, 14:26:14	AddAsset	0000 (Charity)	view record

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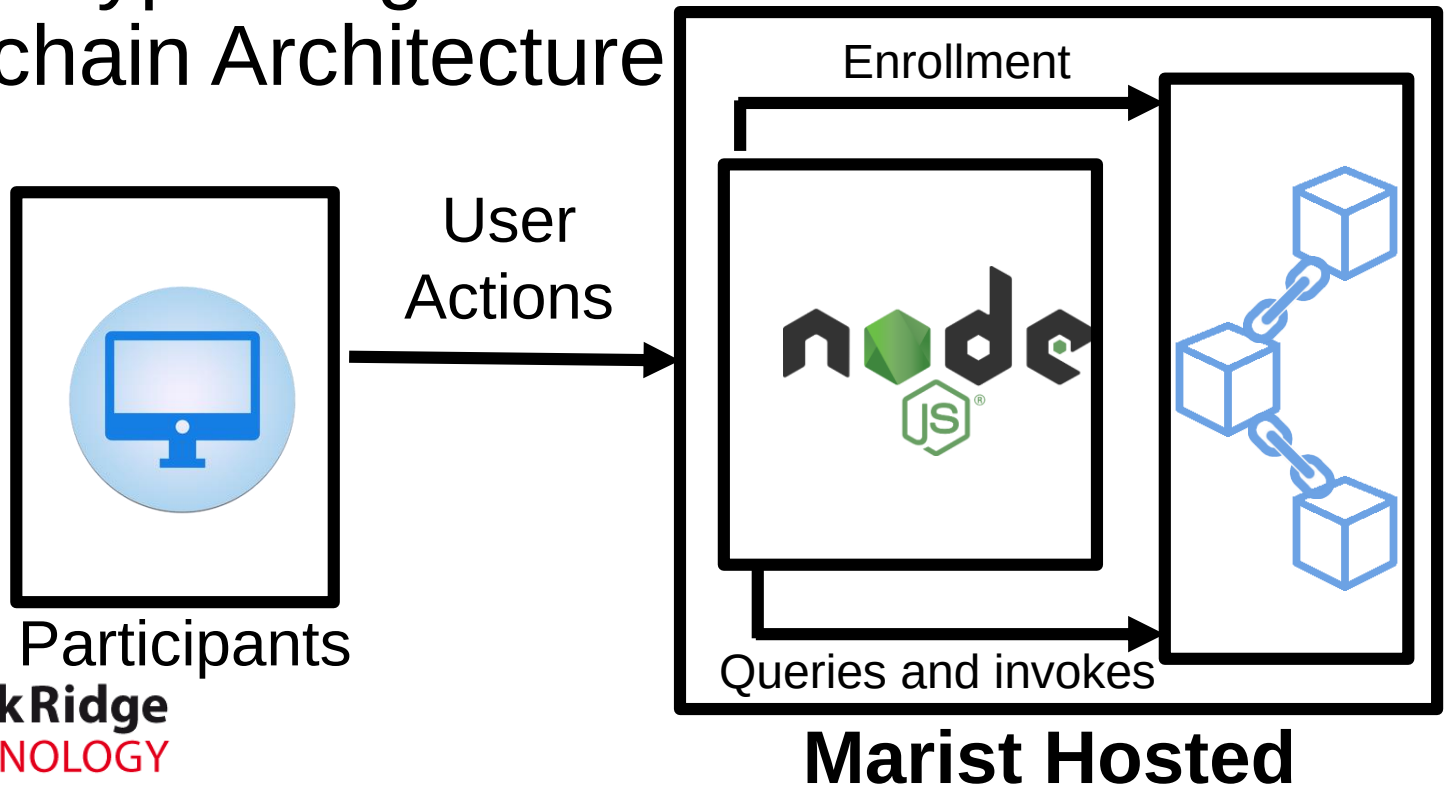
Marist Hyperledger Fabric Blockchain Architecture



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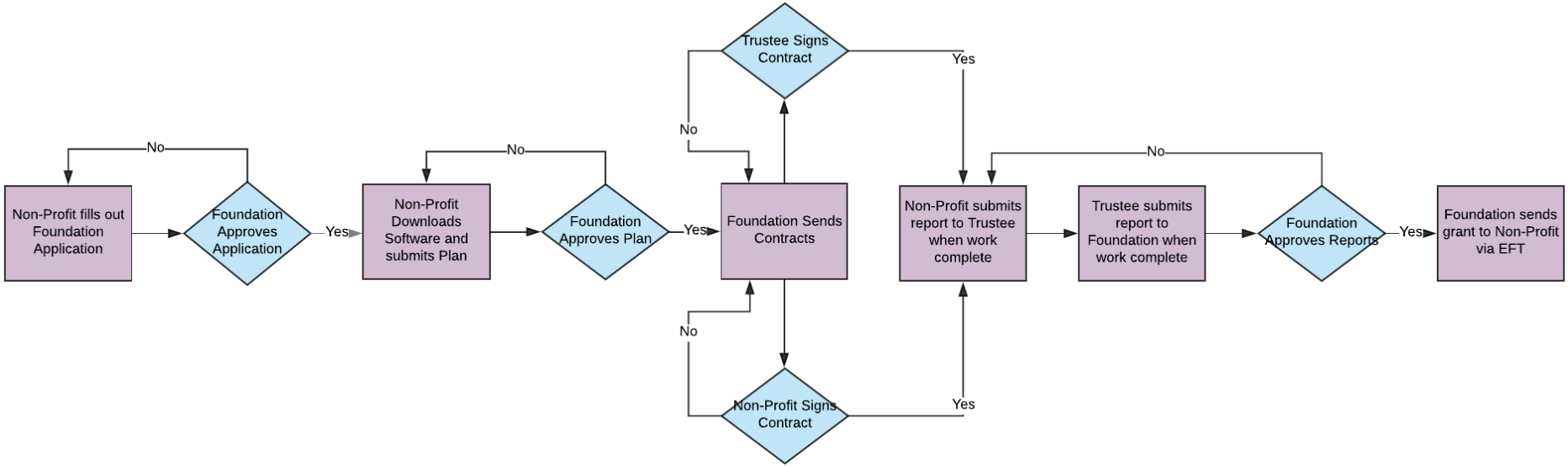
How does it work?



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Development Tools Required

- A tried and proven set of installation instructions (Bare Metal Install Instructions)
- PPTX & Twine (http://twinery.org) for Flowcharting/Simulating solution before coding
- Composer Playground to Graphically develop Blockchain solutions based on BNA files
- Composer Rest Server for generating and debugging REST api calls that get coded in Browser java script
- Gedit to modify html and java script files (customized composer-rest-server files)
- Above is up and running reusing a Composer digitalproperty-network BNA sample application

- To build an application from scratch(not clear this is required):
  - Visual Studio Code with Extensions for Composer and Plantuml which requires Graphviz and Java to be installed
  - This allows graphically editing the bna file contents (digitalproperty-network.cto, .digitallantitle.js. Permissions.acl) with validation checking
  - Allows automatic generation of UML diagrams for the code
  - Composer CLI to create BNA files from a folder created by Visual Studio Code

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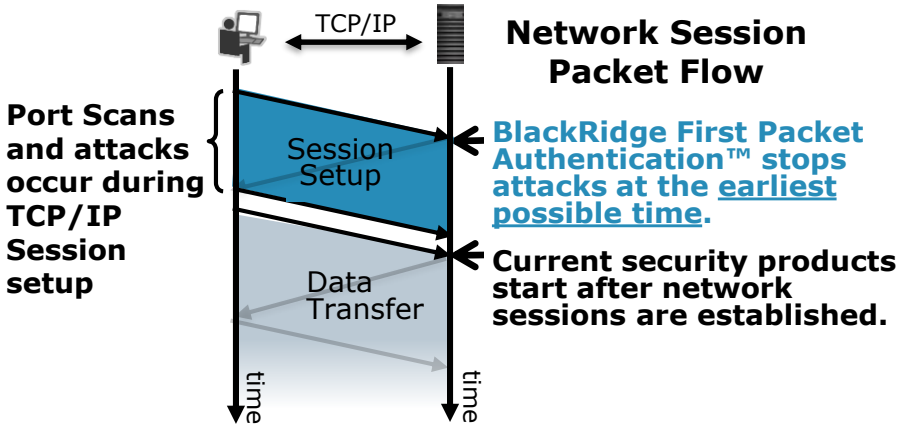
BlackRidge Stops Network-based Attacks and Addresses Network Compliance

- BlackRidge addresses the TCP/IP network vulnerability that is exploited in 100% of cyber attacks
  - BlackRidge authenticates identity and enforces security policy on the first packet, before a network session is established
- BlackRidge isolates and protects servers and applications
  - Stops port scans and network attacks
  - Provides ROI and reduces risk
  - Addresses network segmentation compliance



BlackRidge is like "Caller ID for the Internet."

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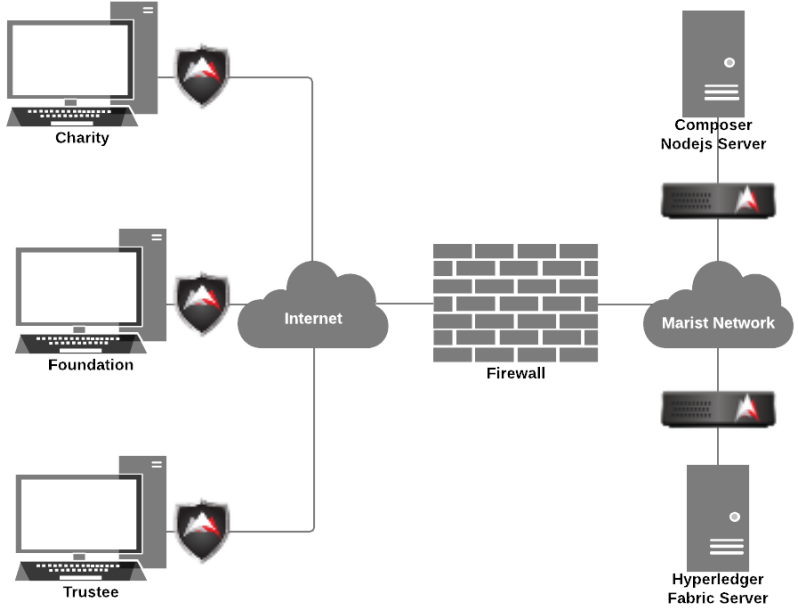
BlackRidge Security

- Given a unique BlackRidge ID that is bound to a Blockchain wallet identity
- Unauthorized access because of compromised keys is eliminated
- Protects against Insider Threats and DOS attacks
- Eliminate Bleichenbacher-style attacks and attacks on TLS ports



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Next Steps/Future Research

- Securing IOT for Blockchain based Healthcare presented at ECC yesterday is follow on to this work
- Leverage Blockchain for Student Certification Application
- Move solution to IBM LinuxONE

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Thank you