

Distributed Ledgers

RESO Fall 2019

Agenda

Coming up to speed on workgroup issues

Discussion on charter of the workgroup and recap events since the RESO Spring Conference
RCPs posted on the collaboration system will be reviewed and voted upon for inclusion

Demonstrations of the Event Model

During RESO Spring Conference, ReConsortia and ShelterZoom discussed their use cases. We will have an update on their progress and two new reference implementations will be demonstrated:

- Brokerage - Use of the Event Model in the **Agent On-Boarding Process**
- MLS - Use of the Event Model in a **Real Time Push Application** for subscribers

Distributed Ledgers and Decentralized Identities

A potential next area for the workgroup to address is the use of decentralized identifiers for referencing event subjects

Coming up to speed on workgroup issues

Release of Draft 1.3

What is in the current draft?

- RESO Distributed Ledger Event Model representing a standard approach that can be used to reliably record, playback, and communicate events
- Examples of the event model and simples to demonstrate the model
- Sections describing components of the model and lookup types

Demonstrations of the Event Model

Draft 1.3 Reference Implementations



Multiple Listing Service


Real time Push Application for subscribers
using the RESO Event Catalog

Events










- Coming Soon
- Price Change
- Active
- Closed
- Message
- Expiring






Channels


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 **Property Service**


< Channel 265 - Hillside District >








-  17 OAK AVE - COMING SOON
message 1559874279594 sent at 02:24
-  30 HIGHGATE CIR - \$659000
message 1559874279536 sent at 02:24
-  4046 HEATHERSTONE CT - COMING SOON
message 1559874279479 sent at 02:24
-  2926 LAWRENCE DR - \$599000
message 1559874279416 sent at 02:24
-  12 AMHERST WAY - COMING SOON
message 1559874279337 sent at 02:24
-  40 U ST NW - \$1245000
message 1559874279281 sent at 02:24
-  234 HARRIS ST - ACTIVE
message 1559874279226 sent at 02:24
-  9 GOLDEN CIRCLE LN - ACTIVE
message 1559874279171 sent at 02:24
-  2004 NORBINA CT - ACTIVE



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 **Property Service**

< Channel 121 - Montgomery County >


 Call (800) 555-1212 to discuss your arbitration case #2018-dvr-6783
message 1561665394485 sent at 19:56








-  10912 BROAD GREEN TER, ROCKVILLE - CLOSED
message 1561665305067 sent at 19:55
-  19601 GASSAWAY LN, GERMANTOWN - CLOSED
message 1561664944993 sent at 19:49
-  110 PRADO LN #2206, CLARKSBURG - COMING SOON
message 1561664824703 sent at 19:47
-  3121 BEAVERWOOD LN, SILVER SPRING - ACTIVE
message 1561664585664 sent at 19:43
-  14709 ELISSA DR, ROCKVILLE - ACTIVE
message 1561664585264 sent at 19:43
-  1013 LOXFORD TER, SILVER SPRING - \$459900
message 1561664226180 sent at 19:37
-  6005 JOHNSON AVE, BETHESDA - CLOSED
message 1561663984814 sent at 19:33

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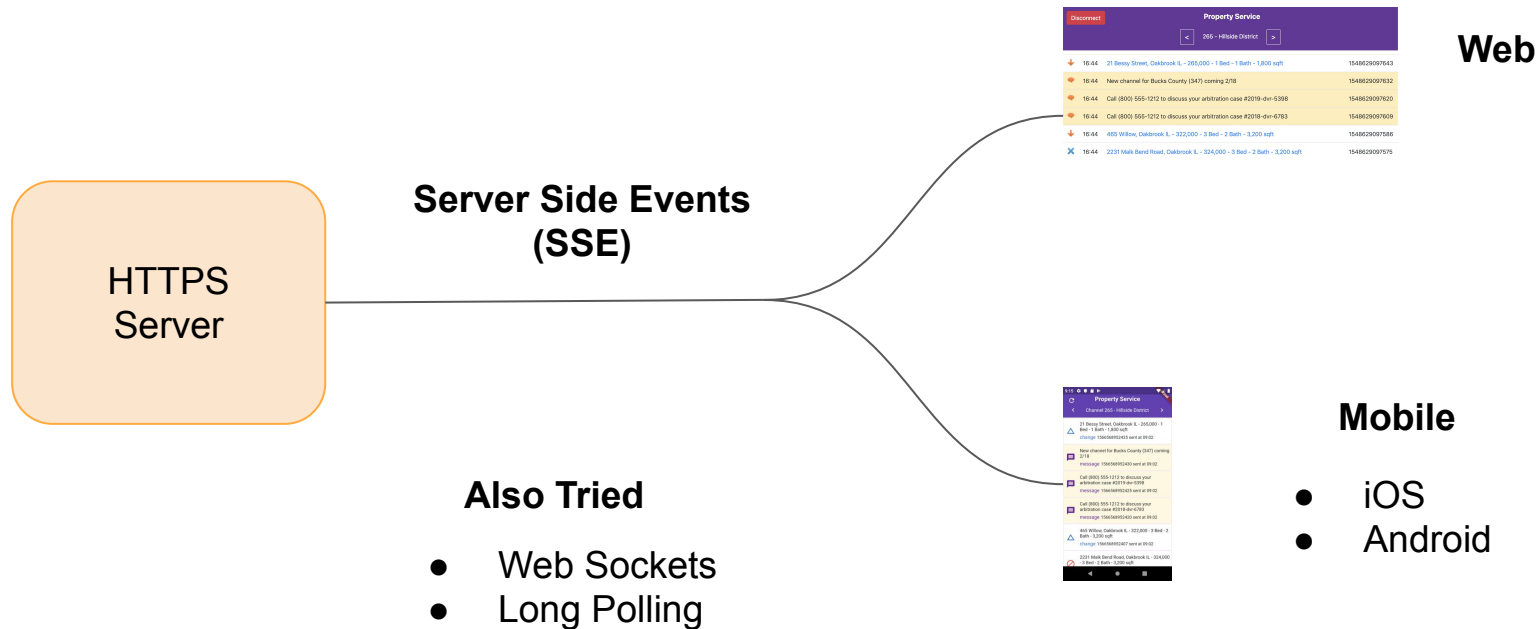
 **Property Service**

< Channel 86 - About to expire >

 Call (800) 555-1212 to discuss your arbitration case #2018-dvr-6783
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-  124 HEMLOCK ROAD, FLINTON - Expires 2019-06-28 - ACTIVE
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-  1 APPLE TREE LN, MOOREFIELD - Expires 2019-06-28 - ACTIVE
message 1561680619666 sent at 00:10
-  SHENANDOAH MOUNTAIN, MATHIAS - Expires 2019-06-28 - ACTIVE
message 1561680619661 sent at 00:10
-  SHENANDOAH MOUNTAIN, MATHIAS - Expires 2019-06-28 - ACTIVE
message 1561680619650 sent at 00:10

Real-Time Push



Real-Time Tap

Talend Data Services Platform (6.3.1.20161216_1026) | Price, Ed | data_quality (Connection: Remote TST ASH 631)

File Edit View Window Help

Learn Ask Exchange

Repository

GLT: data_quality/origin/master (Remote Mode)

- Business Models
 - Job Designs
 - Standard
 - dq254
 - dq876
 - push
 - push_mds_history 0.3
 - Joblet Designs
 - Route Designs
 - Services
 - Contexts
 - Resources
 - Code
 - Routines
 - BrightMdsQueryRoutine 0.1
 - KafkaProducerRoutine 0.1
 - system
 - Beans
 - Job Scripts
 - SQL Templates
 - Metadata
 - Documentation
 - Recycle bin

Job push_mds_history 0.3

Get previous maxModTms

Query MDS History

Hold onto maxModTms for next job run

As a Kafka Producer, send New Listings and Price Drops to Kafka Topic

Designer | Code | Jobscrip

Job Contexts(push_mds_history)

Component Run (Job push_mds_history) Test Cases Integration Action

	Name	Type	Comment	Default	Production
1	mds_admin_username	String		Value BRIGHT_ADMIN	Value BRIGHT_ADMIN
2	mds_admin_password	Password		*****	*****
3	mds_endpoint	String		http://data.mris.com/services/rest/	http://data.mris.com/services/rest/
4	file_raw	String		C:/Users/price/Desktop/In Progress/Bright/	/opt/app/brightmls/prd/data_quality/push/i
5	file_max_mod_tms	String		C:/Users/price/Desktop/In Progress/Bright/	/opt/app/brightmls/prd/data_quality/push/i

AWS Service

The screenshot displays the AWS Management Console interface for an Amazon EC2 instance. The instance is named "EdPrice ECS-optimized Amazon Linux 2 with Docker CE for Kafka" and is located in the "us-east-1a" availability zone. It is currently in a "running" state with a public IP address of 52.205.90.214. The instance is associated with the "edprice-launch-wizard-3" security group, which has several ports open for TCP traffic.

Instance Details:

- Name: EdPrice ECS-optimized Amazon Linux 2 with Docker CE for Kafka
- Instance ID: i-0430031575edd714c
- Instance Type: t2.medium
- Availability Zone: us-east-1a
- Instance State: running
- Status Checks: 2/2 checks passed
- Alarm Status: None
- Public DNS (IPv4): 52.205.90.214
- IPv4 Public IP: 52.205.90.214
- IPv6 IPs: -
- Key Name: bright-kafka-jo...
- Monitoring: disabled

Security Groups associated with i-0430031575edd714c:

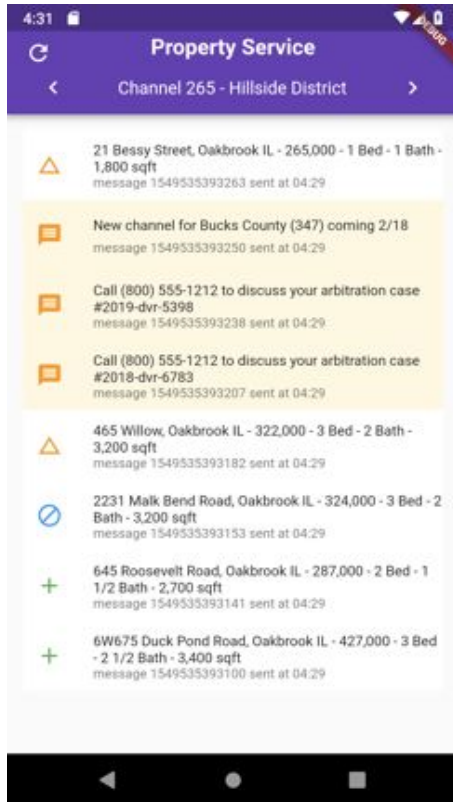
Ports	Protocol	Source	edprice-launch-wizard-3
80	tcp	0.0.0.0/0, :::/0	✓
8080	tcp	0.0.0.0/0, :::/0	✓
22	tcp	0.0.0.0/0	✓
3001	tcp	0.0.0.0/0, :::/0	✓
3000	tcp	0.0.0.0/0, :::/0	✓
9092	tcp	0.0.0.0/0, :::/0	✓

Additional Instance Details:

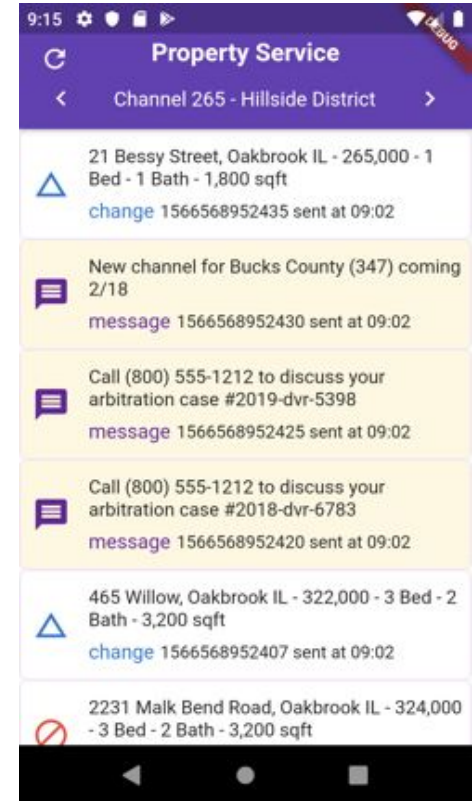
- Public DNS (IPv4): -
- IPv4 Public IP: 52.205.90.214
- IPv6 IPs: -
- Private DNS: ip-10-0-5-155.ec2.internal
- Private IPs: 10.0.5.155
- Secondary private IPs: -
- VPC ID: vpc-050ea7431b50a0a2 (Joe Barbere Dev)
- Subnet ID: subnet-07d502b04c18aad57 (Joe Barbere Dev ECS)
- Network interfaces: eth0
- Source/dest. check: True
- T2/T3 Unlimited: Disabled
- EBS-optimized: False
- Root device type: ebs
- Root device: /dev/xvda
- Block devices: /dev/xvda
- Elastic Graphics ID: -
- Elastic Inference accelerator ID: -
- Capacity Reservation: -
- Capacity Reservation Settings: Open

UI Upgrade



Old




New













Demo

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 **Property Service**








< Channel 265 - Hillside District >



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message 1561680619661 sent at 00:10
-  SHENANDOAH MOUNTAIN, MATHIAS - Expires 2019-06-28 - ACTIVE
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Agent Onboarding

Benefits of tracking events for a brokerage using
RESO Event Catalog

Immediate Benefits - Operational Efficiency

- Onboarding specialists can see where applicants are in the process and proactively assist
- Based on ledger events coming across during the application completion and submittal process, applicants can be identified as 'stuck' in a certain area of the join app
- Internal staff ability to identify and reach out to Agents who are having trouble before they realize they are having trouble will reduce abandoned applications and help the onboarding specialist work more efficiently

Prolonged Benefits - Informed Strategic Decisions

- As a brokerage, the onboarding process can be holistically viewed and analyzed for bottlenecks or other inefficiencies
- The analysis of onboarding events would provide the timeline to get from one major milestone to the next and help determine the need of certain milestones (or the arrangement of them)
- Ultimately, the data recorded would allow for brokerage leaders to make meaningful decisions about onboarding process improvement












Proposed Events

- New Application
- Personal Information Records
- Primary License Information
- Additional License Information
- Experience Records
- Financial Records
- Verification Stage
- Approval Stage
- Reviewing Stage
- Record Transfer
- Email Verification
- Independent Contract Agreement
- Organization/Agent Change

Events with States

- Application **Started**
- License **Provided**
- Experience **Provided**
- Financial **Provided**
- ICA **Signed**
- Verification **Complete**
- Verification **Failed**
- License **Verified**
- License **Approved**
- License **Denied**
- Approval **Complete**
- License **Transferred**
- Email **Verified**
- Organization **Joined**

[illegible]

	LICENSE1 TRANSFERRED Mon, 09 Sep 2019 20:49:48 GMT	AGENT MICAH
	ICA COMPLETE Mon, 09 Sep 2019 20:49:39 GMT	AGENT MICAH
	ICA SIGNED Mon, 09 Sep 2019 20:49:21 GMT	AGENT BROKER
	ICA SIGNED Mon, 09 Sep 2019 20:48:13 GMT	AGENT BROKER
	ICA SIGNED Mon, 09 Sep 2019 20:46:57 GMT	AGENT BROKER
	LICENSE1 APPROVED Mon, 09 Sep 2019 20:46:28 GMT	AGENT MICAH
	LICENSE1 APPROVED Mon, 09 Sep 2019 20:45:17 GMT	AGENT MICAH
	LICENSE1 APPROVED Mon, 09 Sep 2019 20:44:14 GMT	AGENT MICAH
	LICENSE1 VERIFIED Mon, 09 Sep 2019 20:44:02 GMT	AGENT MICAH
	LICENSE1 VERIFIED Mon, 09 Sep 2019 20:42:38 GMT	AGENT MICAH
	APPLICATION COMPLETE Mon, 09 Sep 2019 20:38:11 GMT	AGENT AGENT

Referrals Tracking

Tracking referrals using
RESO Event Catalog

Referral Lifecycle Events

Support different professionals that interact with the referrals such as: getting help from transaction coordinators

Support common scenario such as: split referrals. Professional needs to split a referral and change the compensation structure accordingly

Maintain its integrity, but at the same time be flexible enough to support real use cases. Referral may change since the moment is created, until its close

Proposal for tracking Events in a Referral System

- System Name - Referral Marketplace Service
- Subject Type - Sub Referral
- Entity - Transaction Coordinator
- Events - Sub Referral, Compensation, Source, Destination
- States - Added, Splitted ...

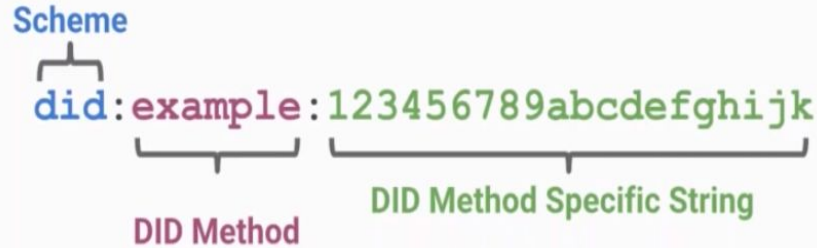
Next Steps

Where do we go from here?

A potential next area for the workgroup to address is identity management using **Decentralize Identifiers**. The Event Model is already designed to support decentralized identifiers so this direction is logical

Distributed Ledgers and Decentralized Identities

Decentralized Identifiers are globally unique, highly available and cryptographically verifiable



A diagram illustrating the structure of a Decentralized Identifier (DID). The string "did:example:123456789abcdefghijklmnopqrstuvwxyz" is shown. Above the "did:" prefix is the label "Scheme". Below the "example:" prefix is the label "DID Method". Below the "123456789abcdefghijklmnopqrstuvwxyz" suffix is the label "DID Method Specific String". Brackets are used to group these parts: a bracket under "did:" points to "Scheme"; a bracket under "example:" points to "DID Method"; and a bracket under the entire suffix points to "DID Method Specific String".

Example:

`did:v1:nym:BcNkgGmGEpCGSJSMPB4BvWvwVM6YeTR52BSWcZTbzU23`

Decentralized Identifiers (DIDs)

- DIDs resolve to DID Documents describing how to use that specific DID
- Each DID Document may express cryptographic material, verification methods, and/or service endpoints
- The DID Document contains attributes or claims about the DID Subject

```
{  
  "@context": "https://example.org/example-method/v1",  
  "id": "did:example:123456789abcdefghi",  
  "service": [{  
    "serviceEndpoint": "https://example.org/"  
  }]  
}
```

DID Document - Example

```
{  
  "id": "did:reso:upid:xxx-xxxxx-xxxxx-xx",  
  "service": [{ //could be used to retrieve associated property history  
    "id": "did:reso:upid:xxx-xxxxx-xxxxx-xx#history",  
    "type": "PropertyHistoryService",  
    "serviceEndpoint": "https://mls.com/get"  
  }, { //or to retrieve associated parcel data and more...  
    "id": "did:reso:upid:xxx-xxxxx-xxxxx-xx#parcel",  
    "type": "ParcelDataService",  
    "serviceEndpoint": "https://county.gov/parcel"  
  }  
}
```

Event Referencing a DID

```
{  
  "TransactionId" : "4b46aadd-0f2a-4e79-b3a6-e2e45927d2a2",  
  "EventSubject": "did:reso:upid:US-42049-49888-1213666-R-N",  
  "System" : "Transaction Management",  
  "SubjectType" : "Property",  
  "Entity" : "Broker",  
  "Event" : "Contract",  
  "State" : "Signed",  
  "Recorder" : "did:reso:oid:abcdefgh12345678#0001",  
  "Timestamp" : "Sun, 03 Jun 2018 13:04:05 GMT",  
  "Application" : "87478-a43"  
}
```

Questions?

Distributed Ledgers

Thank You!

Mark Lesswing - mark@lesswing.com

Ashish Antal - aantal@mlslistings.com

reso.org/distributed-ledger-workgroup



License1
Verified(12)
Transferred(2)



Application
Complete(13)



ICA
Signed(8)
Complete(6)

License1

- #J26531
License1 Verified Yesterday
- #J26530
License1 Verified Yesterday
- #J26535
License1 Transferred Yesterday
- #J26534
License1 Transferred Yesterday
- #J26544
License1 Verified Yesterday
- #J26542
License1 Verified Yesterday
- #J26546
License1 Verified Yesterday

Application

- #J26536
Application Complete Yesterday
- #J26538
Application Complete Yesterday
- #J26539
Application Complete Yesterday
- #J26540
Application Complete Yesterday
- #J26541
Application Complete Yesterday
- #J26543
Application Complete Yesterday

ICA

- #J26537
ICA Signed Yesterday
- #J26533
ICA Complete Yesterday
- #J26532
ICA Signed Yesterday
- #J26545
ICA Complete Yesterday

THANKS

J26532

J26531

J26530

J26537

J26538

J26536

J26539

J26540

J26541

J26542

J26543

