

Development of an Approach to Evaluate HL7 Message Success across Multi-Level Pathways

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Background

- HL7 messaging to MCIR occurs in complex ecosystem
 - EHR --> Regional HIE --> MiHIN --> MDHHS Data Hub --> MCIR
- There have been issues in the past
 - Very long transit times
 - Duplicate instances of messages
 - Misdirected responses

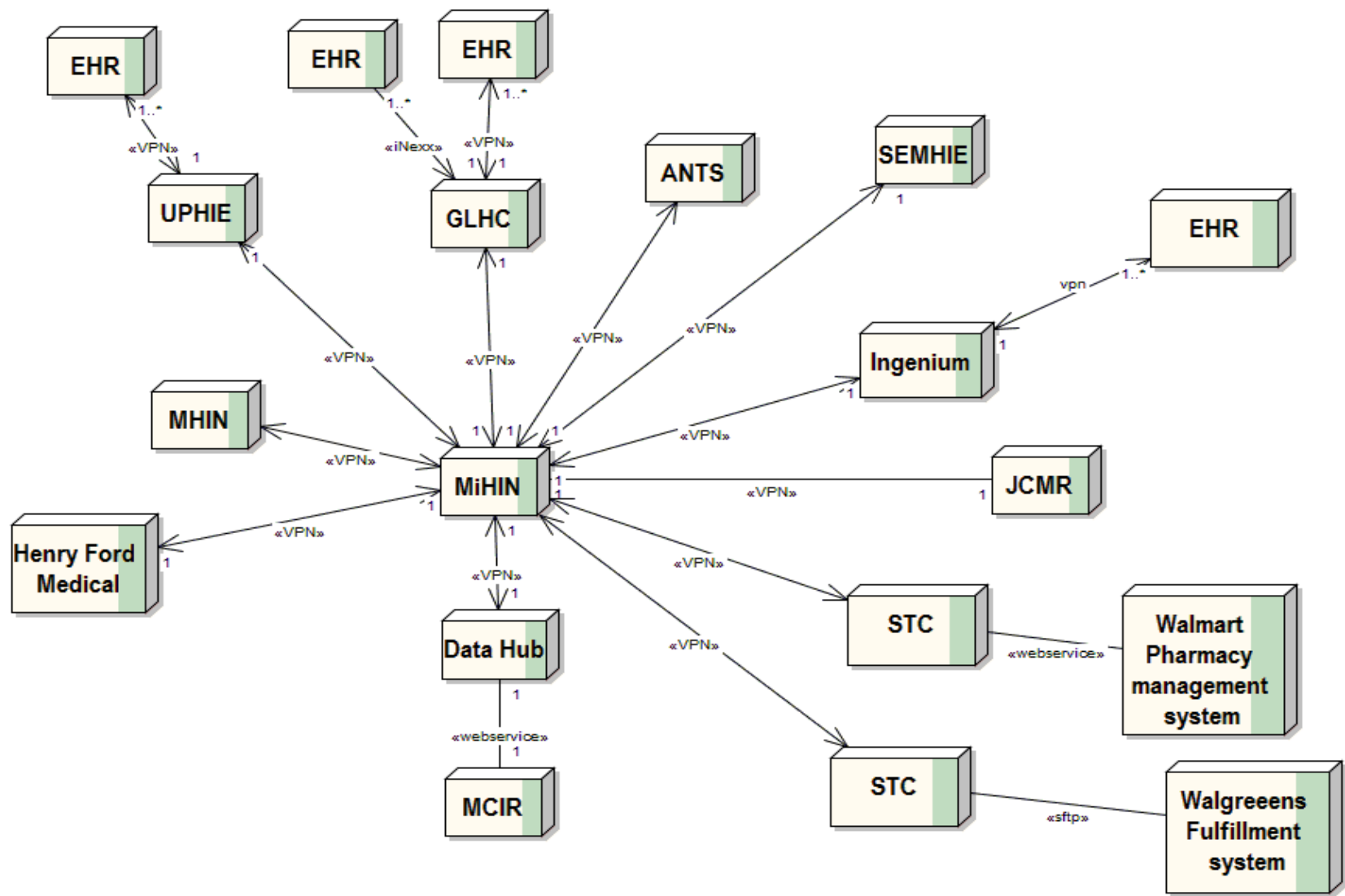
Objectives

- Document the messaging landscape between EHR and MCIR
- Document the impact of variance between systems
- Develop an evaluation process that identifies timeliness and data quality issues

Methods

- Structured interview with teams at each point in message flow
 - Identify downstream partner
 - Transport layer to downstream partner
 - Describe processing of received message
 - Determine if accepts acknowledgment from downstream partner
 - List problems encountered
- Documented the various pathways that messages travel
- Evaluated log data

deployment connections



**Submitting
Site**

HIE-QO

MiHIN

**MDHHS
Data
Hub**

MCIR



Interview Results—Supported Messages

- Interviewed 5 of 10 Qualified Organizations (QO)
- 5 of 5 Send VXU messages
- 1 QO regularly sending QBP and receiving RSP
- 1 QO has some organizations sending QBP
- 1 QO is in on-boarding process
- 2 QO (pharmacies) will implement QBP/RSP in future

Interview Results--Transport

- Most connections were via VPN
- Largest QO receives most messages via proprietary connection (one way only)
- Connection from MDHHS Data Hub to MCIR is a web service
- No connections used DIRECT
- No connections used CDC SOAP wsdl

Results—QO Processing

- 1 QO examines MSH-4 and MSH-6 to assure valid entries
 - Invalid entries cause message rejection by QO
- 1 QO modifies MSH-4 and MSH-6 to be valid entries and returns an Accept Acknowledgement
- 1 QO does not evaluate or modify message
- 2 QO return ACK from MCIR to EHR
 - 1 only does for its VPN partners

MiHIN Processing

- Logs sender and message
- Does not evaluate message
- Does not modify the message
- Logs acknowledgement
- Returns response message from MDHHS Data Hub to Qualified Organization

MCIR and MDHHS Data Hub VXU and ACK Processing

- MDHHS Data Hub reviews MSH on receipt
 - Rejects if not addressed correctly
- MDHHS Data Hub logs copy of message
- MDHHS Data Hub passes raw HL7 message to MCIR
- MCIR parses and validates message
- MCIR creates ACK and returns to MDHHS Data Hub
- MDHHS Data Hub returns ACK

MCIR and MDHHS Data Hub QBP/RSP Process

- MDHHS Data Hub examines MSH for correct addressing
- MDHHS Data Hub parses and extracts message
- MDHHS Data Hub populates web service call with query data and sends to MCIR
- MCIR finds client
- MCIR populates web service call with answer and returns to MDHHS Data Hub
- MDHHS Data Hub packages as RSP and returns to MiHIN

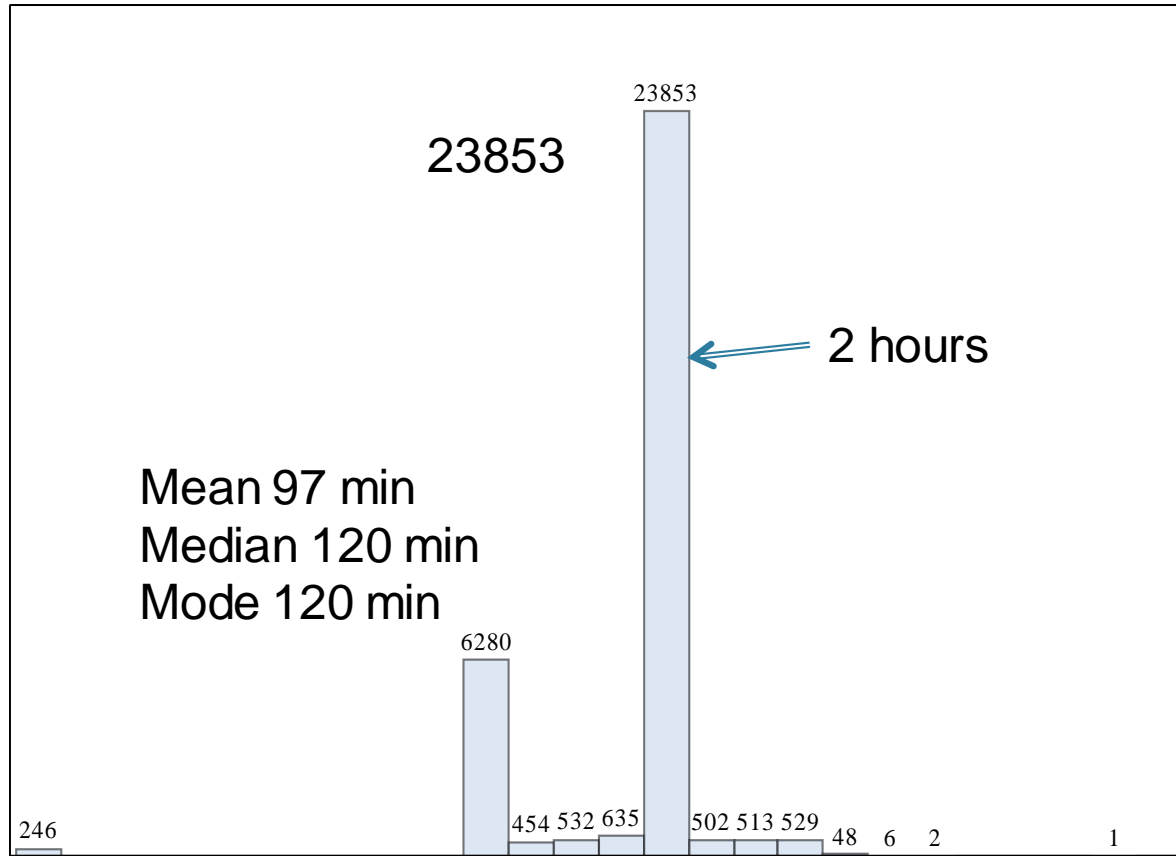
Problems Identified

- Occasional significant lag between sending message and receiving response
- Time zone issues in some messages
- Not all messages get acknowledgement returned
- System seems to get jammed up due to message volume
- Slow down triggers message resend leading to duplicate instances of a given message
- Responses have gone to the wrong endpoint

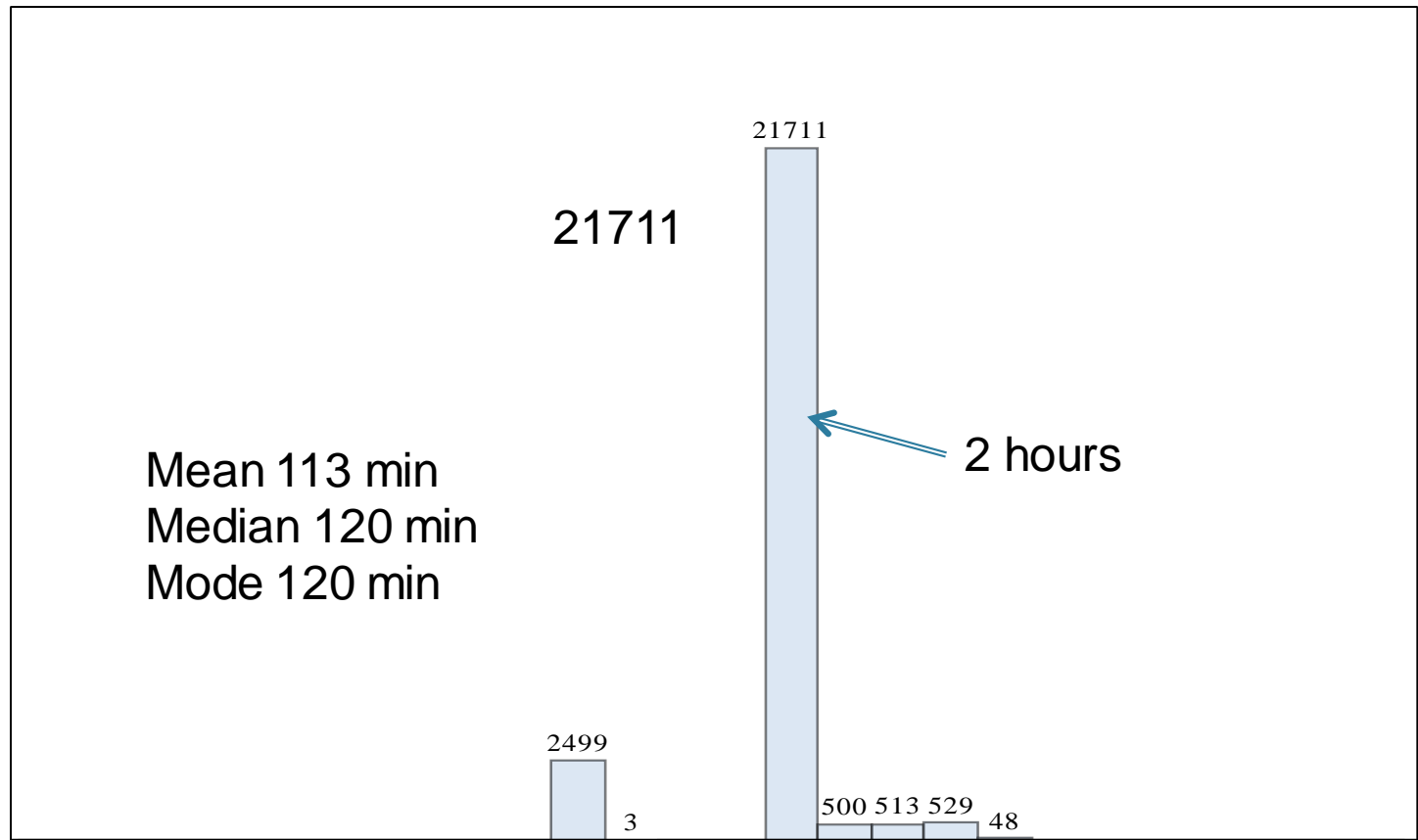
Using Log Data to Diagnose Problems

- MDHHS Data Hub and MCIR log incoming messages and Acknowledgements
 - Lag time between message creation and Acknowledgement message creation
 - Link VXU to ACK (MSH-10 to MSA-2)
 - VXU-send time minus ACK-send time
 - Duplicate messages sent
 - Match on MSH-10 (control id)
 - Mismatched acknowledgment
 - Match VXU Sending organization to ACK Receiving Org

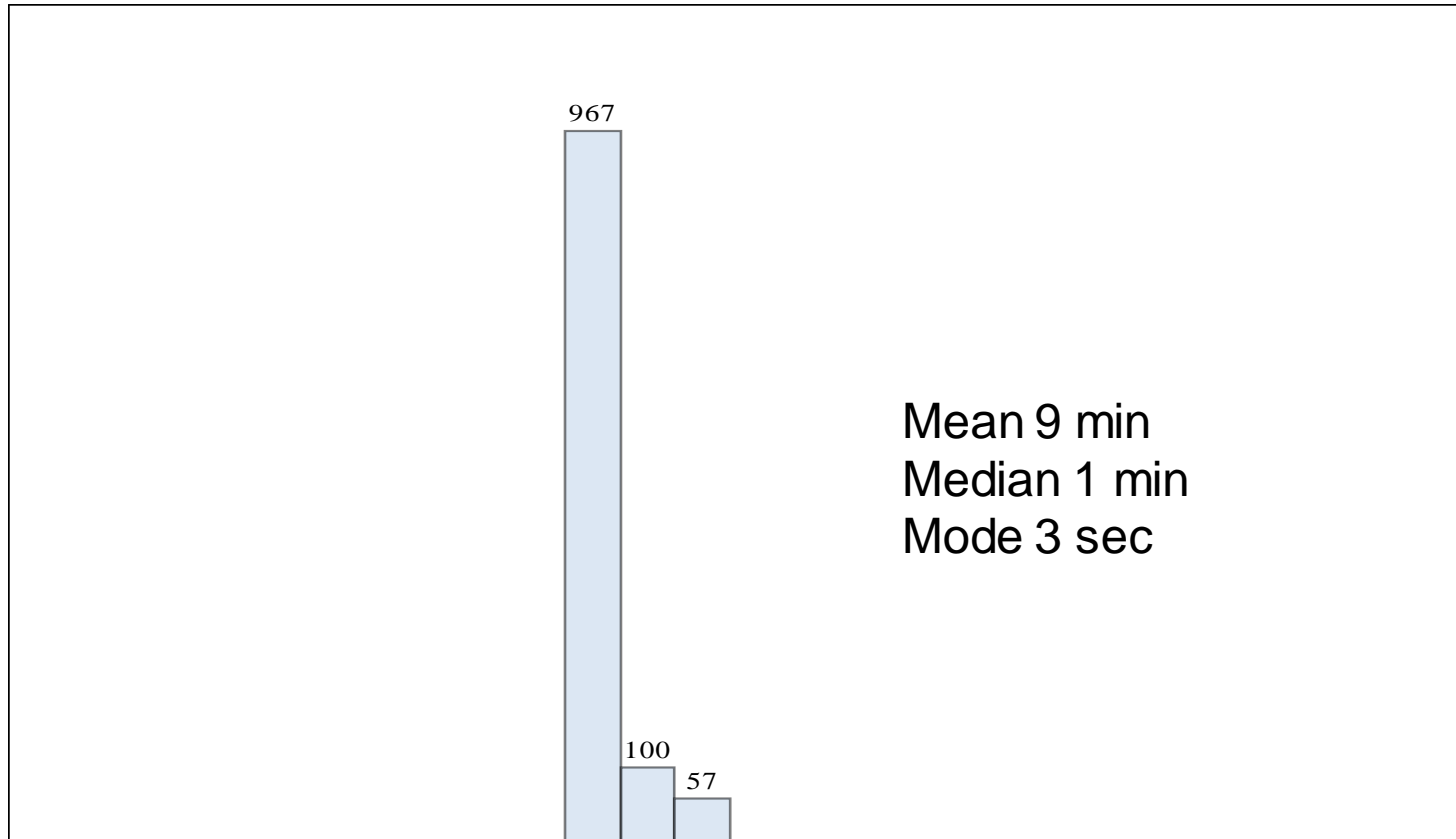
Lag time for Message on 1/27/16 in Seconds



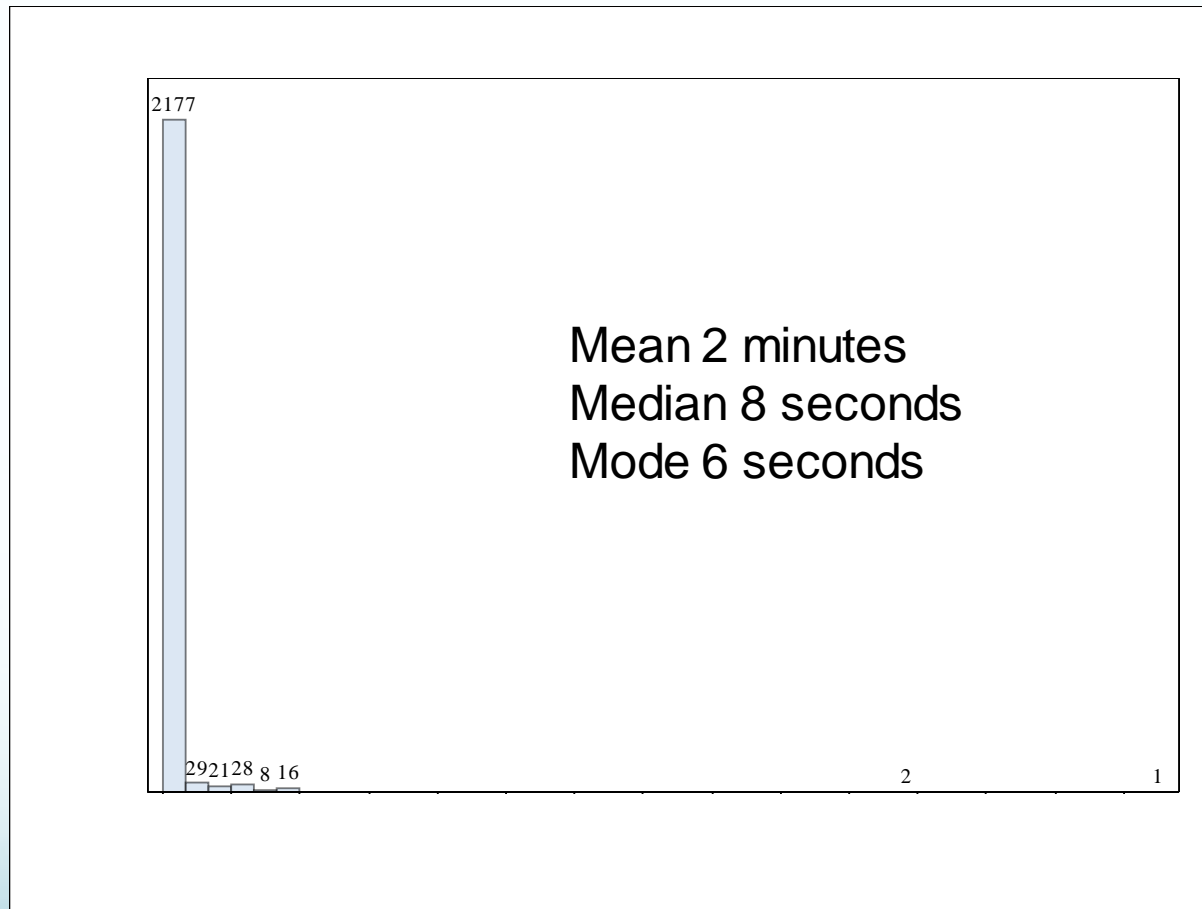
VXU Lag Time (seconds) Regional HIE A



VXU Lag Time (seconds) Regional HIE B



Qualified Organization Not Going through Regional HIE



Using Log Data from MDHHS Data Hub

- Log Data captured at MDHHS Data Hub is useful for monitoring
 - slow downs/delays
 - duplicate messages being sent
 - for misdirected acknowledgments
 - message volume
 - System clock variations

Comparing sender logs with hub logs

- Matched messages on sender and control id
- Not all messages get to Data Hub
- Some QO sending multiple copies of a message

Lessons Learned

- Investigate pathways for messages to identify potential points of failure
 - Who connects to whom
 - How do they connect (Transport layer)
 - Does this support bidirectional messaging?
 - Do they modify message?
 - Do they receive Acknowledgement
 - What do they do with it?
- Assure synchronization of system clocks and inclusion of time zone in message.
- Log messages received and sent
- Understand implications of data quality issues by node

Potential Next steps

- Trace messages through system using logs at each node
- Develop a monitoring system that relies on logs to identify problems and gives a read on message volume and success rate

Thanks

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