

3D Weather Visualisation

Virginia Tech Blacksburg, VA, 24061

Sarah Nimitz, Duke Forsyth, Andrew Knittle

Client: Zachary Duer Trevor White

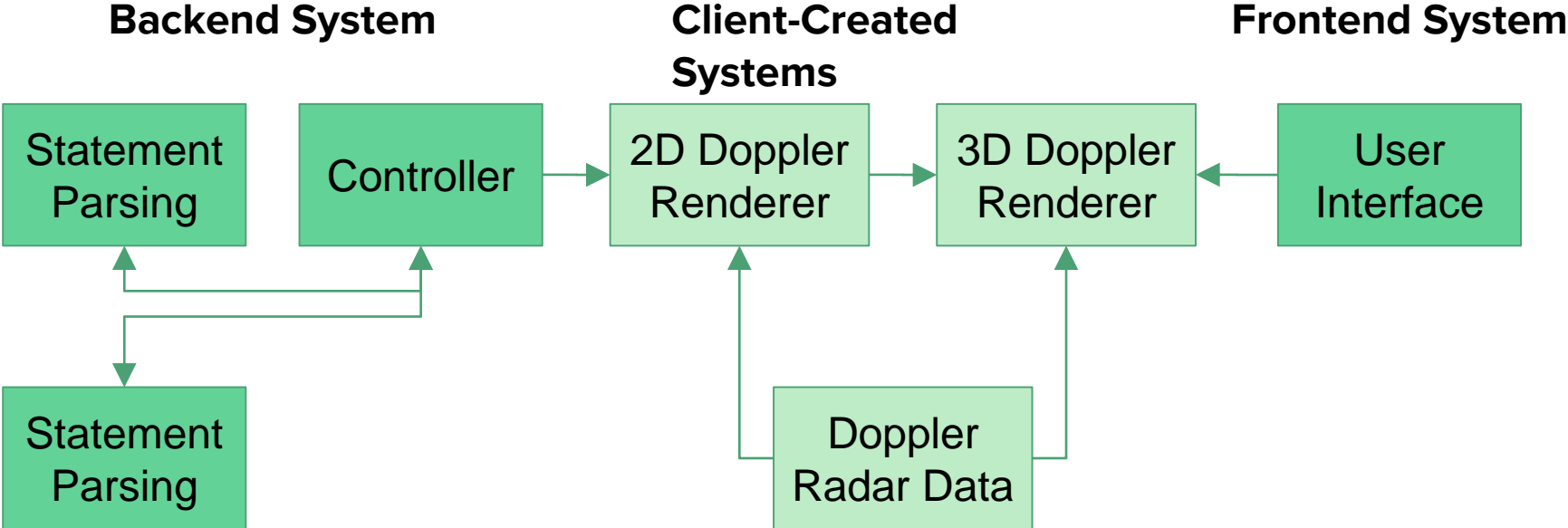
CS 4624

4/28/2016

Overview

- Worked with Zachary Duer and Trevor White
- Portions of a larger project
- The Cube
- 3D Doppler radar data
- Unity and C#

Structural Overview



Frontend:

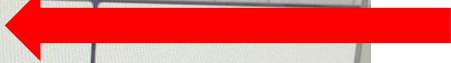
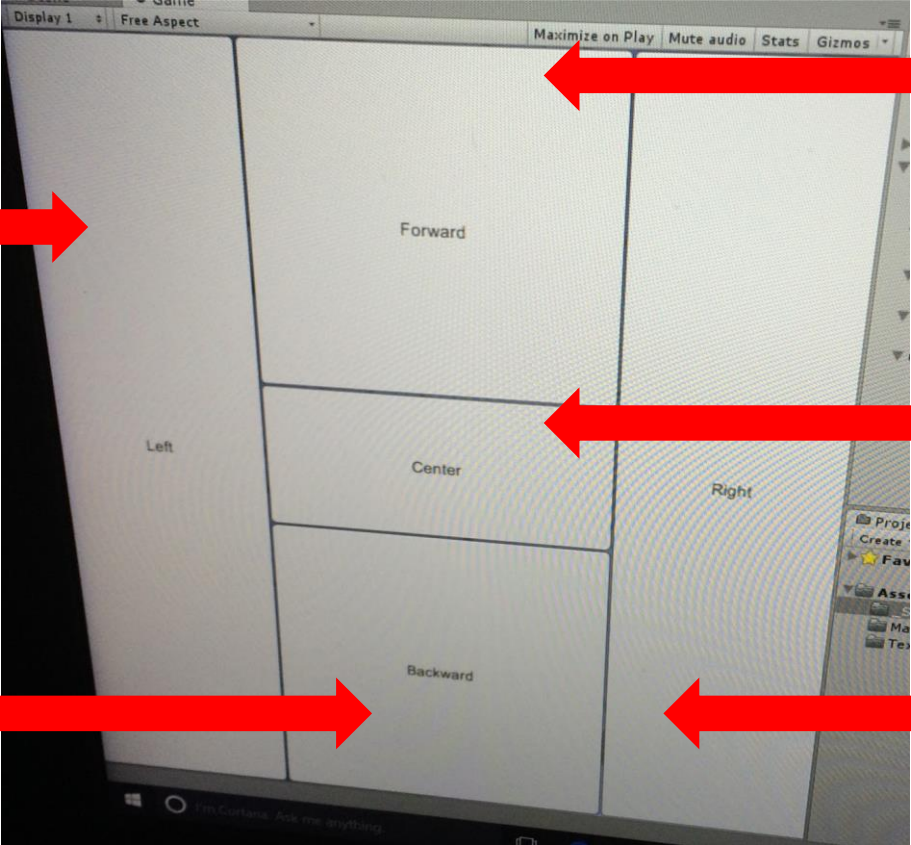
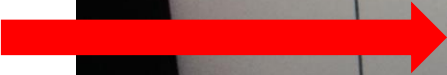
- From the front end the user chooses where to be positioned in 3D Space using a tablet
 - Done through Unity built interface
- Simple UI for simple movement
- Big buttons because the screen is hard to see with goggles
- 4 buttons to move in 4 directions
 - 1 button to bring the user back to the center

Frontend: UI Representation

Move
Left



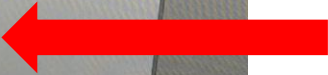
Move
Backward



Move
Forward



Back to
Center

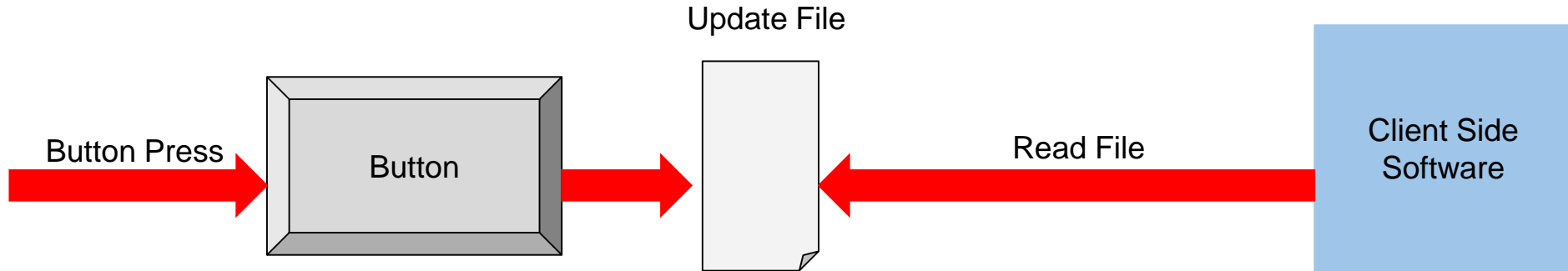


Move
Right

Frontend: Logic

- Unity Editor provides API
- Each button had a corresponding C# script that moves the user.
 - The code for each button only differs between directions to move
- Update gets called after every move by the user
 - The user's position is then updated to the current position and then writes out the position in a formatted data file
 - The file will then be used by the client's software so that VR and/or AR goggles can update the user's POV in the 3D scene

Frontend: Logic Flow

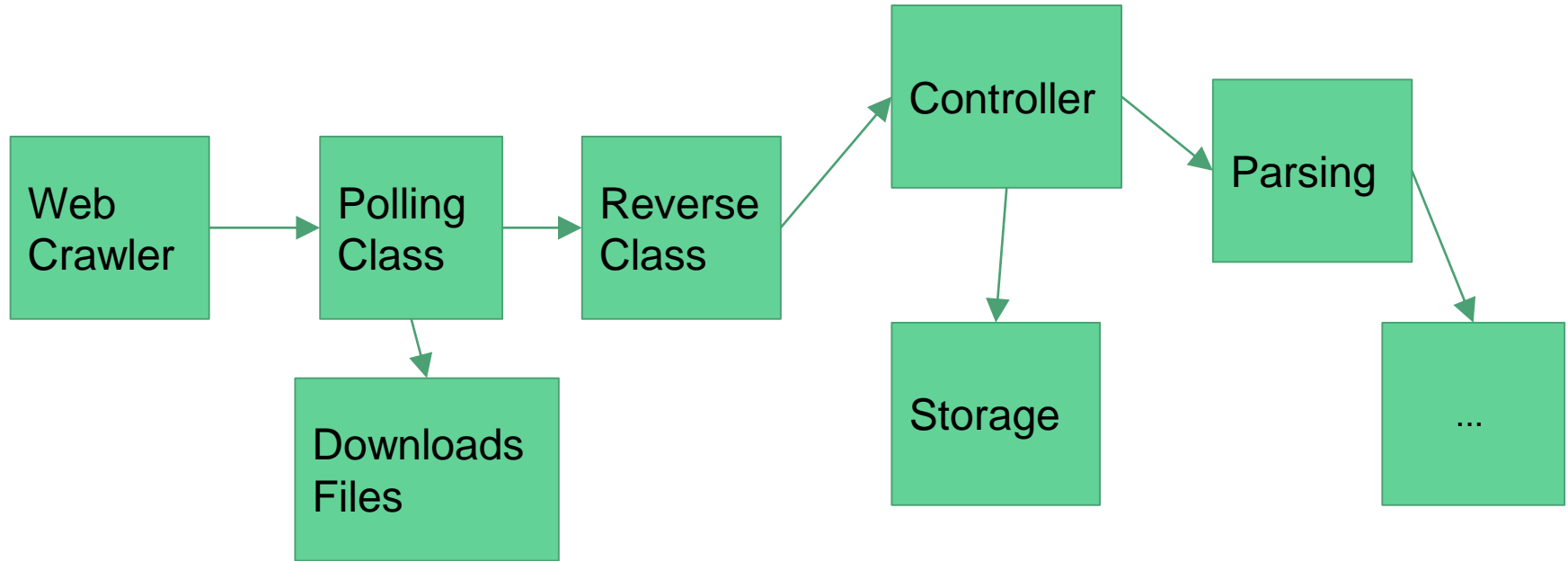


Clients' Work

- Trevor White takes the warning information
 - Renders onto 2D doppler data
 - Allows users to interact with warnings
 - Displays related severe weather statements
 - Allows user to step back to previous timeframe
- Zachary Duer takes input from Trevor's program
 - Renders 3D doppler data in Unity
 - Uses augmented reality/virtual reality headset

Polling

The main website: <http://warnings.cod.edu/>



Parsing

- Files from College of DuPage broken into statements
 - They sort by publication time
 - We sort by relevant warning
- Statements parsed for
 - Publication Time
 - Warning ID
 - Warning Duration
 - etc
- Warning objects created/updated/stored
- Active warnings tracked

322
WFUS54 KOUN 201940
TOROUN
OKC027-051-087-109-202015-
/O.NEW.KOUN.TO.W.0024.130520T1940Z-130520T2015Z/

BULLETIN - EAS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE NORMAN OK
240 PM CDT MON MAY 20 2013

THE NATIONAL WEATHER SERVICE IN NORMAN HAS ISSUED A

* TORNADO WARNING FOR...
NORTHWESTERN MCCLAIN COUNTY IN CENTRAL OKLAHOMA...
SOUTHERN OKLAHOMA COUNTY IN CENTRAL OKLAHOMA...
NORTHEASTERN GRADY COUNTY IN CENTRAL OKLAHOMA...
NORTHERN CLEVELAND COUNTY IN CENTRAL OKLAHOMA...

* UNTIL 315 PM CDT

* AT 238 PM CDT...NATIONAL WEATHER SERVICE METEOROLOGISTS DETECTED A
SEVERE THUNDERSTORM CAPABLE OF PRODUCING A TORNADO. THIS
DANGEROUS
STORM WAS LOCATED NEAR NEWCASTLE...AND MOVING EAST AT 20 MPH.

IN ADDITION TO A TORNADO...LARGE DAMAGING HAIL UP TO GOLF BALL SIZE
IS EXPECTED WITH THIS STORM.

* LOCATIONS IMPACTED INCLUDE...
NORMAN...MOORE...NEWCASTLE...BRIDGE CREEK AND VALLEY BROOK.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

TAKE COVER NOW IN A STORM SHELTER OR AN INTERIOR ROOM OF A STURDY
BUILDING. STAY AWAY FROM DOORS AND WINDOWS.

&&

LAT...LON 3522 9740 3519 9771 3530 9775 3543 9744
TIME...MOT...LOC 1940Z 248DEG 19KT 3526 9766

\$\$
30

322
WFUS54 KOUN 201940
TOROUN
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Station ETN

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Warning Type

Publication Time

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Expiration Time

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LAT...LON 3522 9740 3519 9771 3530 9775 3543 9744

TIME...MOT...LOC 1940Z 248DEG 19KT 3526 9766

Warning Vertices

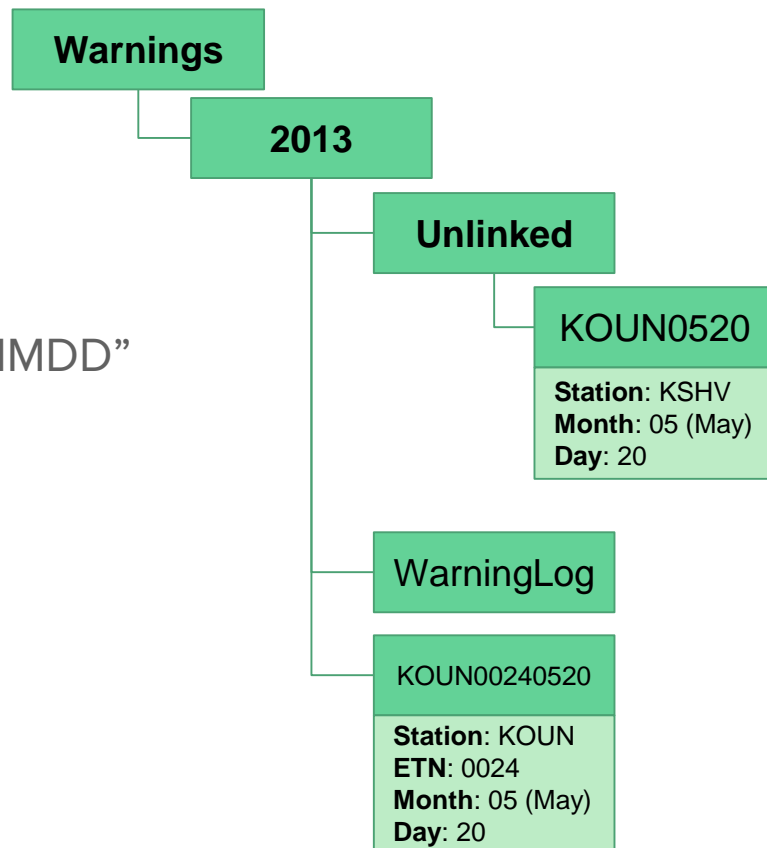
LAT...LON 3522 9740 3519 9771 3530 9775 3543 9744
TIME...MOT...LOC 1940Z 248DEG 19KT 3526 9766

Time Degrees Speed Location

\$\$
30

Writing to File

- Statement text stored in file
 - Stores statements without warnings
 - Accessible at later time
- Stored in format “YEAR\SSSS####MMDD”
 - YEAR - Four-digit year of publication
 - SSSS - Station issuing the warning
 - #### - Event Tracking Number (ETN)
 - MM - Month of warning start
 - DD - Day of warning start
- Log of warning start/end times
- Unlinked statements separated
 - “YEAR\SSSSMMDD”
 - Year, Station, Month, Day



Acknowledgements

- **Zachary Duer** for allowing us to work on the frontend
- **Trevor White** for teaching us about severe weather statements, and allowing us to work on the backend
- **College of DuPage** for their server and collection of severe weather statements