HURRICANE PROCESSOR

ARCHITECTURAL DIAGRAMS

HURRICANE PROCESSOR

- .NET 8 project
- Front end: console application
- Back end: SQL Server database provider

HURRICANE PROCESSOR

- Imports and transforms Atlantic Hurricane Database file provided by National Hurricane Center
- Retrieves hurricane event location from the API or GeoJson file based on the latitude/longitude
- Creates Excel report with hurricanes that landed in the certain US state(s) and displays it to the user

APPLICATION'S DETAILED FEATURES

- Caching transformed hurricane data into CSV file
- Saving hurricanes into the database
- Reading hurricanes from either HURDAT2 or the CSV file

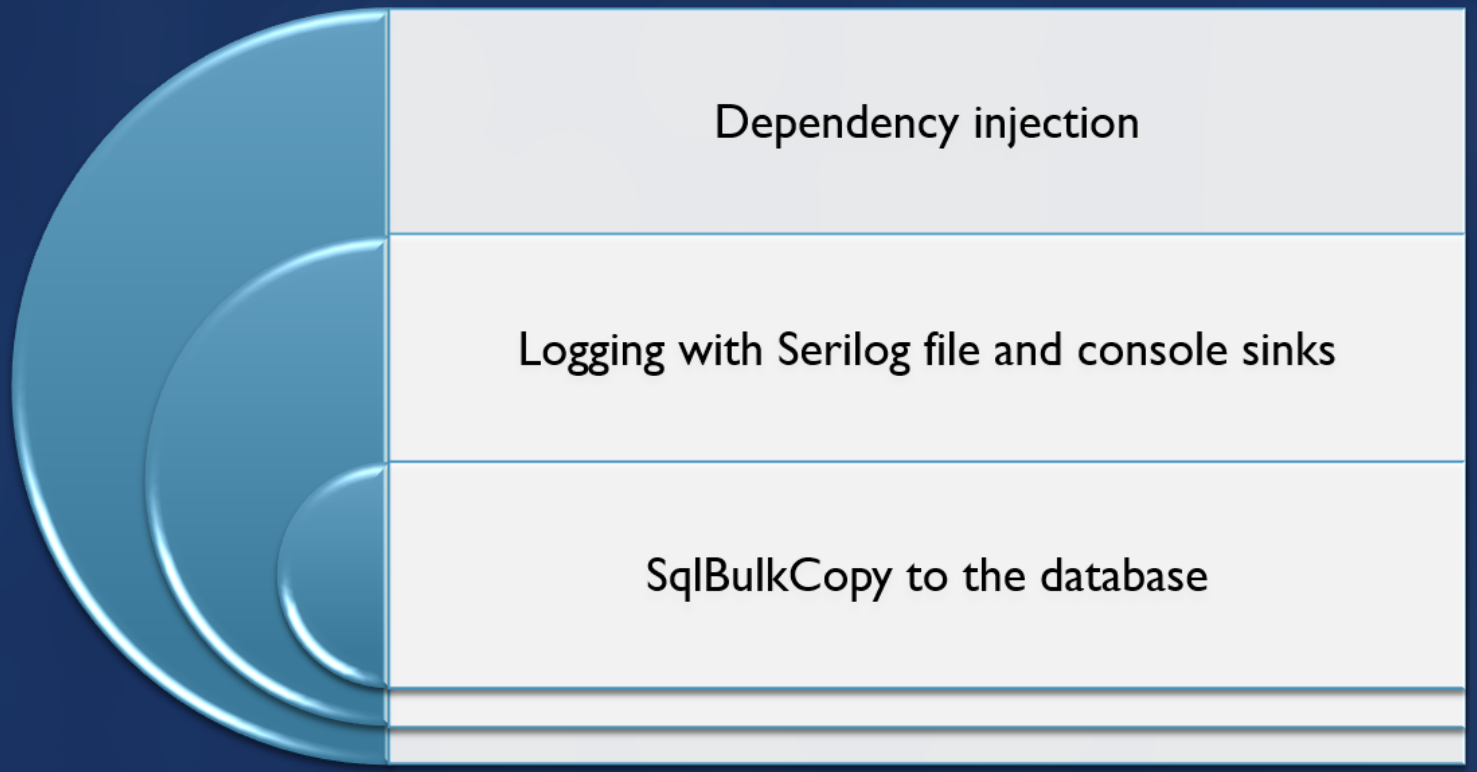
APPLICATION'S DETAILED FEATURES

- Retrieving hurricane addresses from either Online/Offline APIs or GeoJson file
- Saving hurricane addresses into the database and CSV file
- Reading hurricane addresses from either API or CSV/GeoJson files

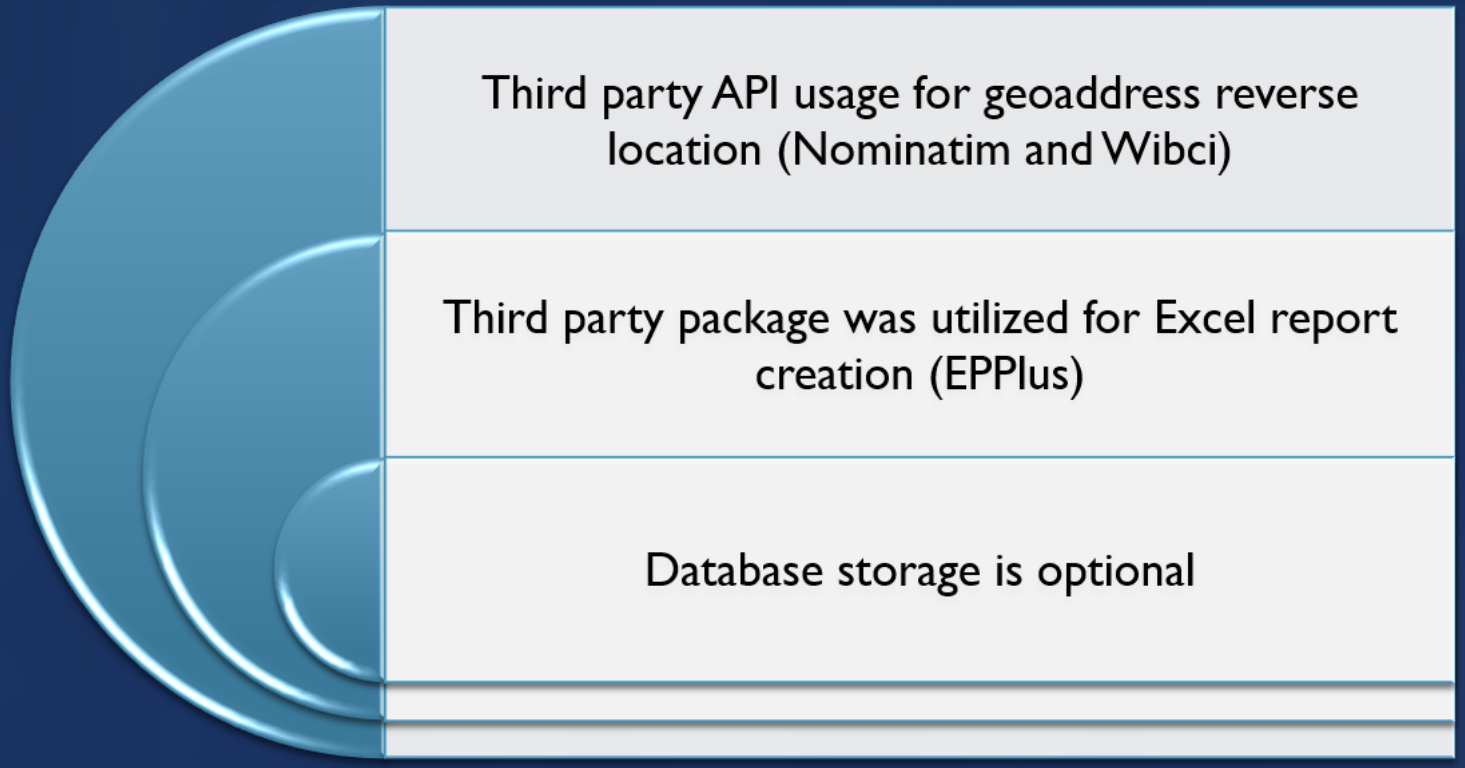
APPLICATION'S DETAILED FEATURES

- Retrieving hurricane report data from either the database or CSV files
- Producing report file based on the input source without overriding reports from previous sources
- Optionally displaying report to the user

HURRICANE PROCESSOR



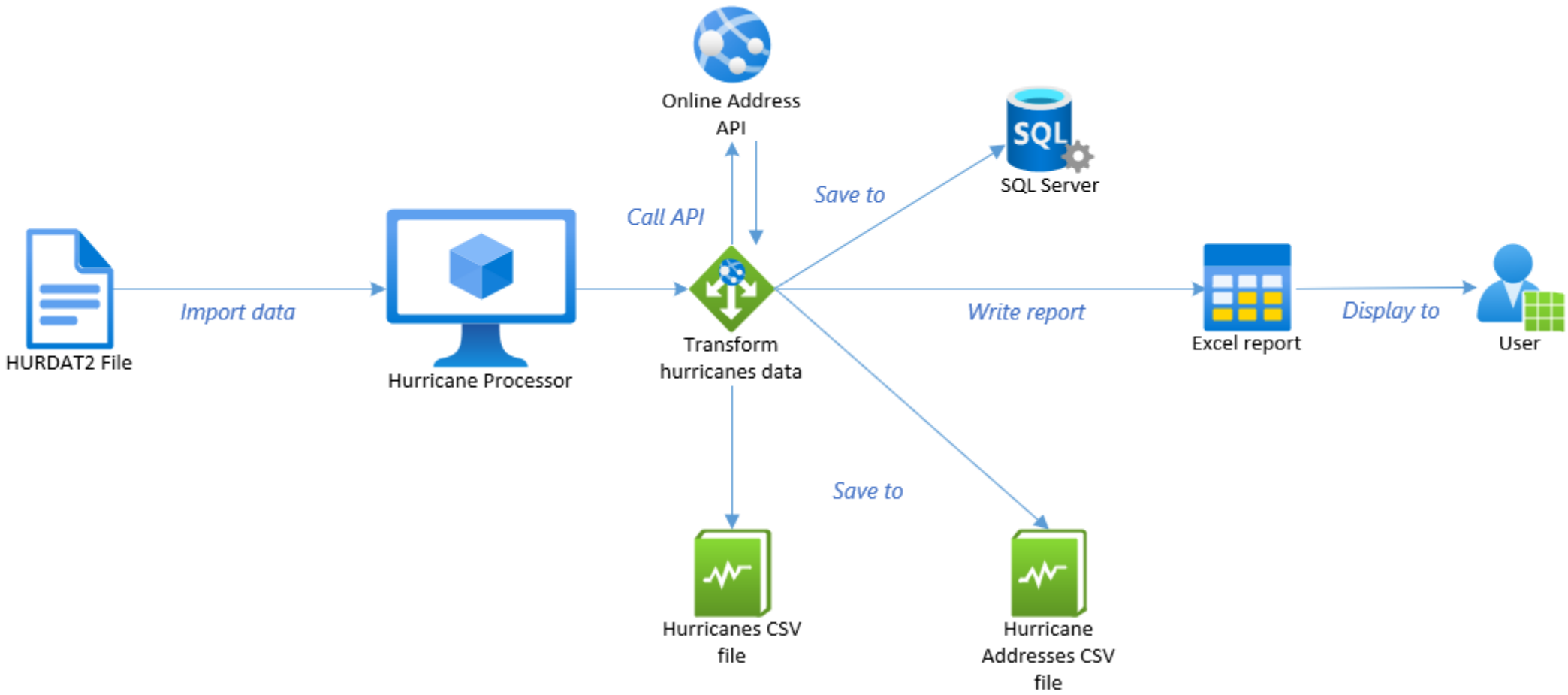
ADDITIONAL APPLICATION DETAILS



APPLICATION MAIN WORKFLOWS

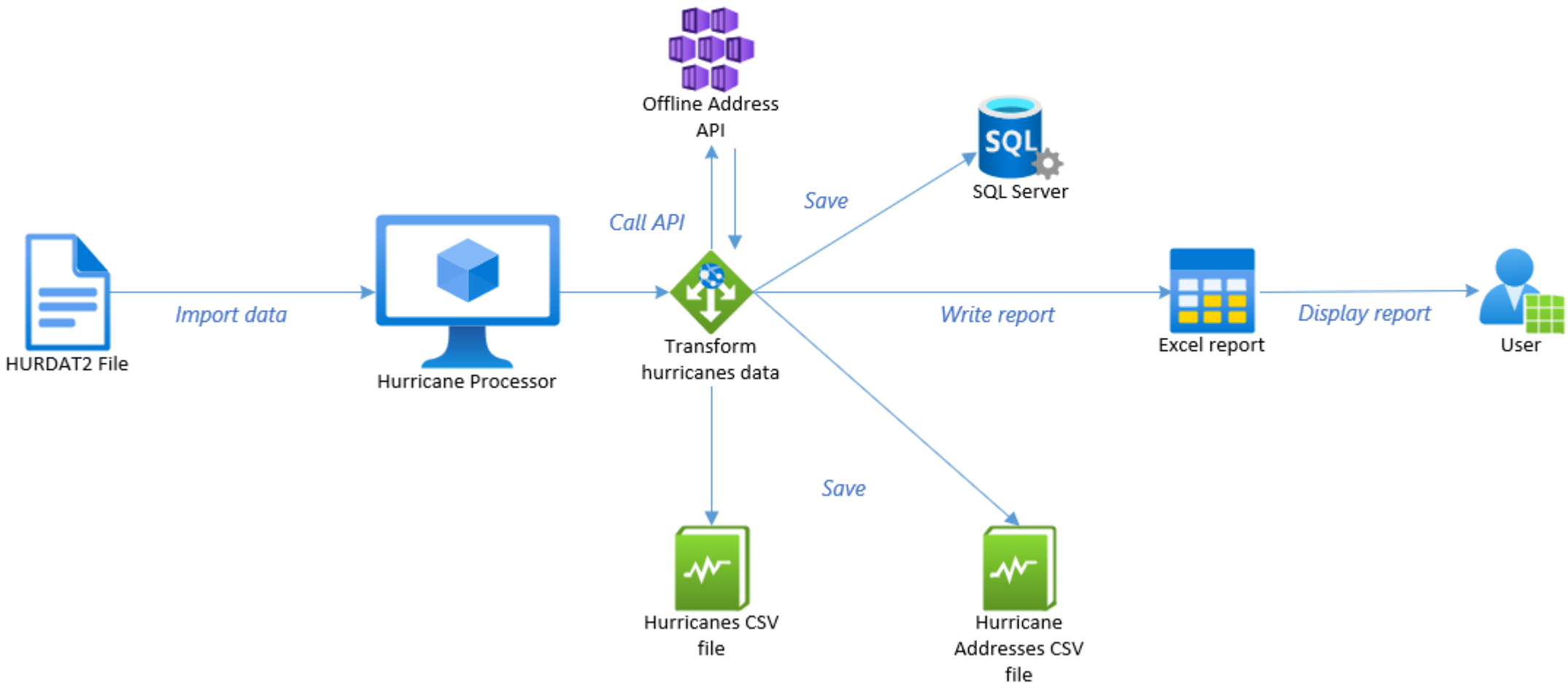
Workflow

Initial hurricane import with online API addresses and data caching to CSV files and database



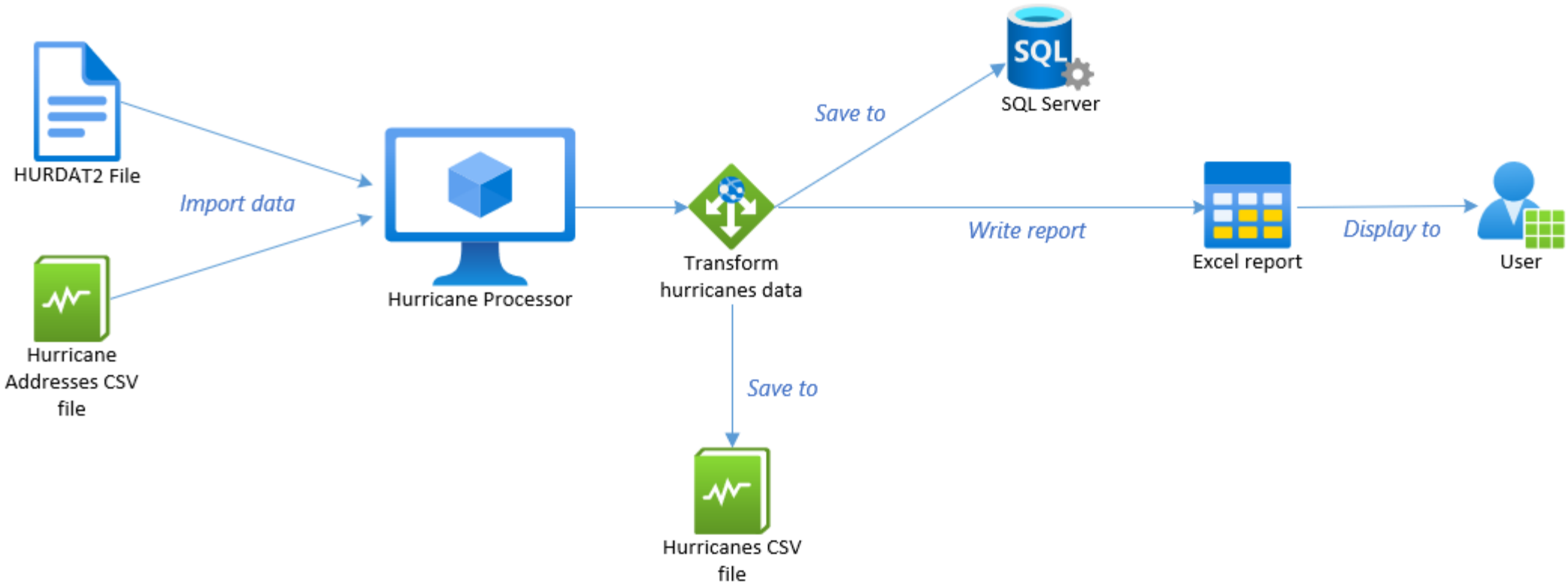
Workflow

Initial hurricane import with offline API addresses and data caching to CSV files and database



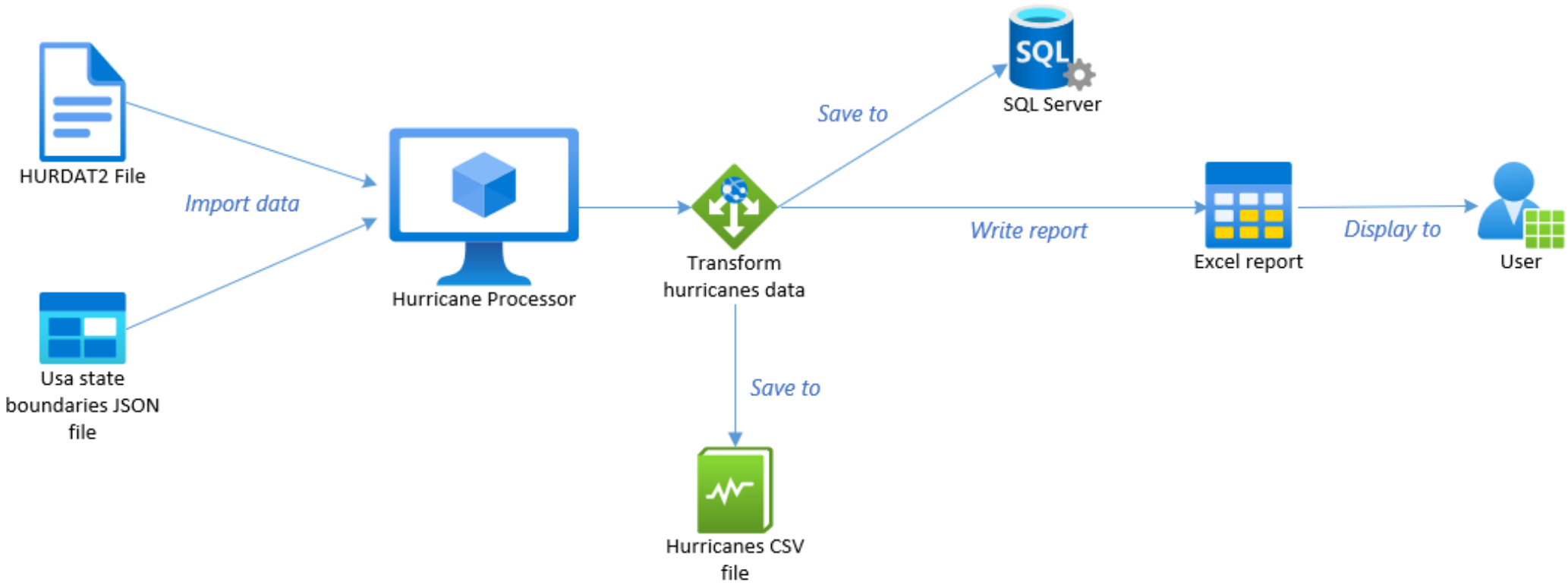
Workflow

Initial hurricane import with cached addresses and data persistence to CSV file and database



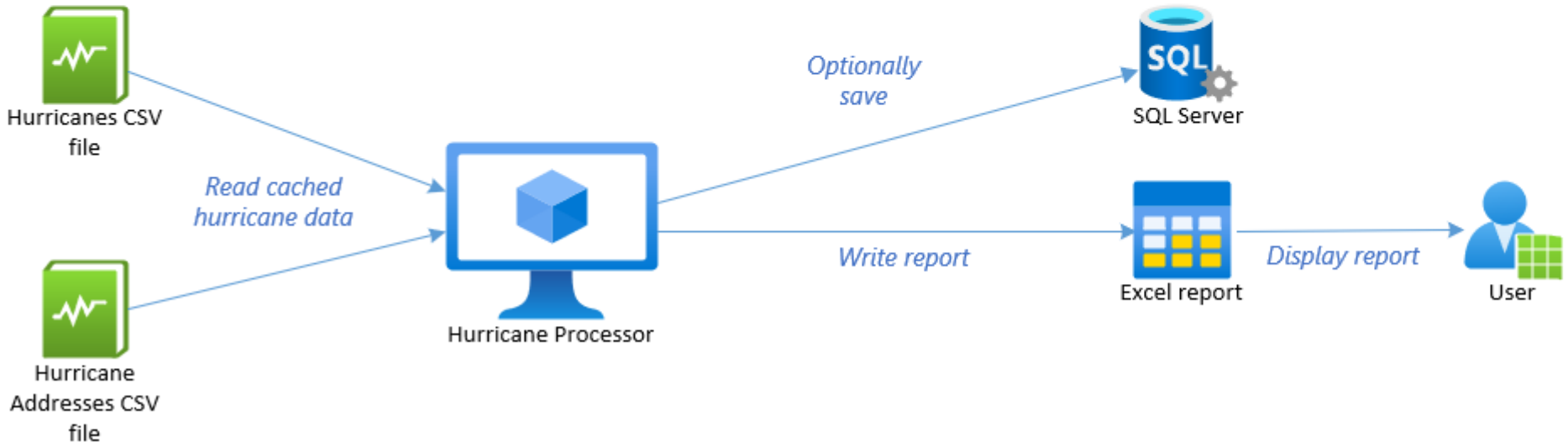
Workflow

Initial hurricane import with JSON addresses and data persistence to CSV file and database



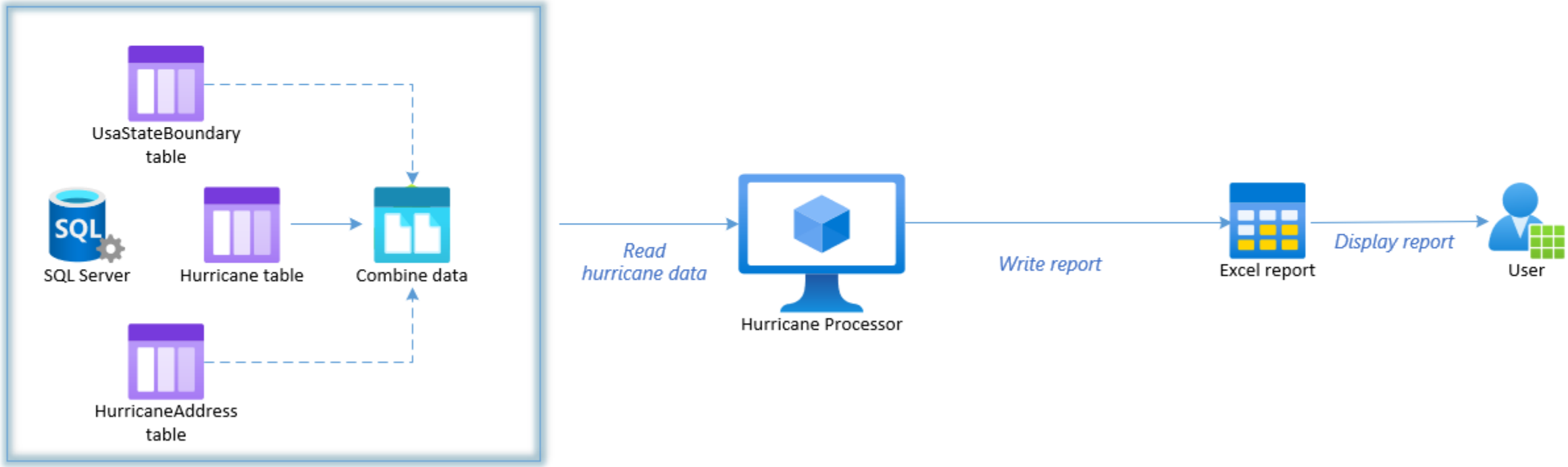
Workflow

Use cached hurricanes and their addresses to produce Excel report and optionally save data to database



Workflow

Read hurricanes and their addresses from database to produce Excel report

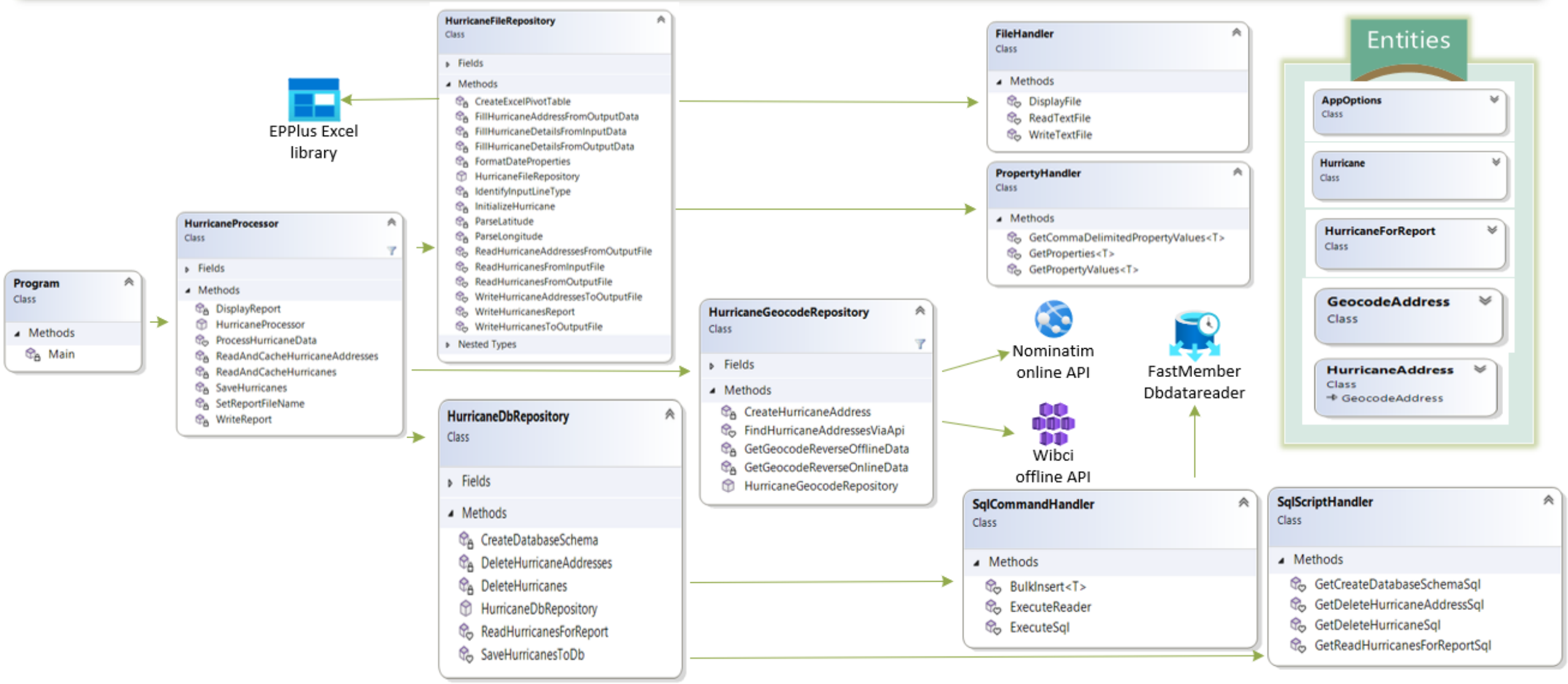


APPLICATION COMPONENTS

- Project classes and third party libraries
- Data files
- Database tables

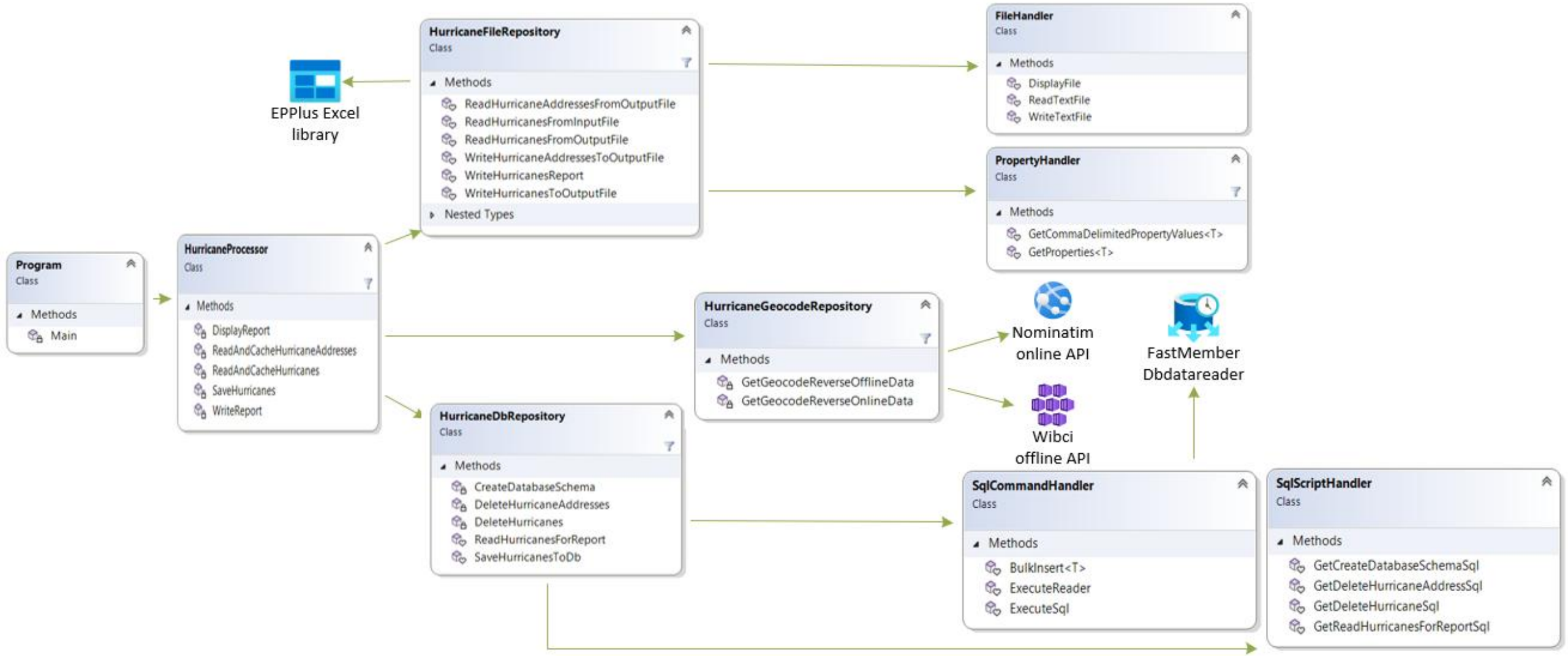
Hurricane Processor

Application class diagram: Functional classes



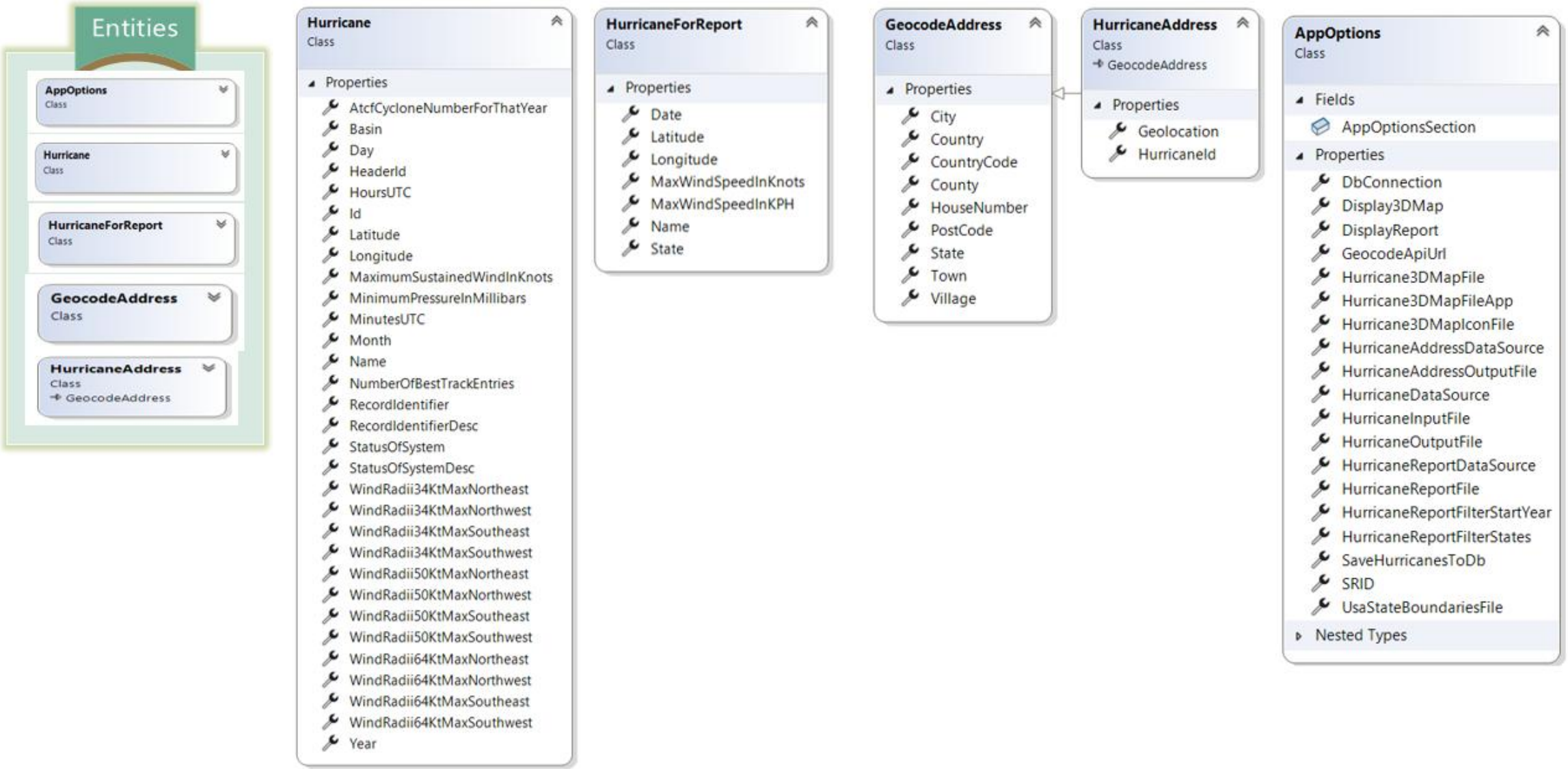
Hurricane Processor

Application class diagram: Functional class key methods



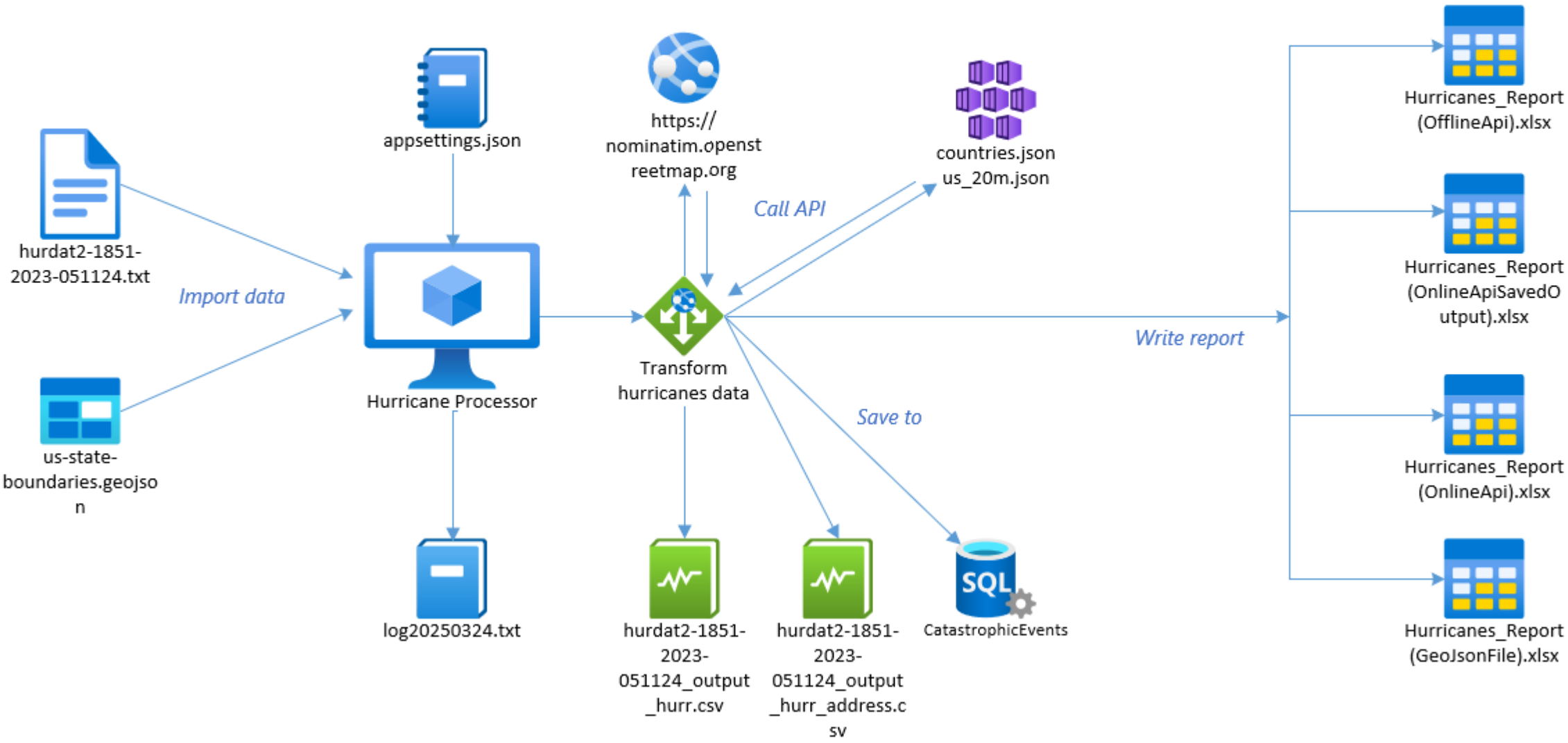
Hurricane Processor

Application class diagram: Entities



Hurricane Processor

Application data sources and targets



Hurricane Processor

Application database tables

CatastrophicEvents

Hurricane

🔑	Id
	HeaderId
	Basin
	AtcfCycloneNumberForThatYear
	Name
	NumberOfBestTrackEntries
	Year
	Month
	Day
	HoursUTC
	MinutesUTC
	RecordIdentifier
	RecordIdentifierDesc
	StatusOfSystem
	StatusOfSystemDesc
	Latitude
	Longitude
	MaximumSustainedWindInKnots
	MinimumPressureInMillibars
	WindRadii34KtMaxNortheast
	WindRadii34KtMaxSoutheast
	WindRadii34KtMaxSouthwest
	WindRadii34KtMaxNorthwest
	WindRadii50KtMaxNortheast
	WindRadii50KtMaxSoutheast
	WindRadii50KtMaxSouthwest
	WindRadii50KtMaxNorthwest
	WindRadii64KtMaxNortheast
	WindRadii64KtMaxSoutheast
	WindRadii64KtMaxSouthwest
	WindRadii64KtMaxNorthwest

HurricaneAddress

	HurricaneId
	Country
	CountryCode
	County
	HouseNumber
	PostCode
	State
	Town
	Village
	City
	Geolocation
🔑	Id

Relationship 'FK_HurricaneAddress_Hurricane_HurricaneId' between 'Hurricane' and 'HurricaneAddress'

UsaStateBoundary

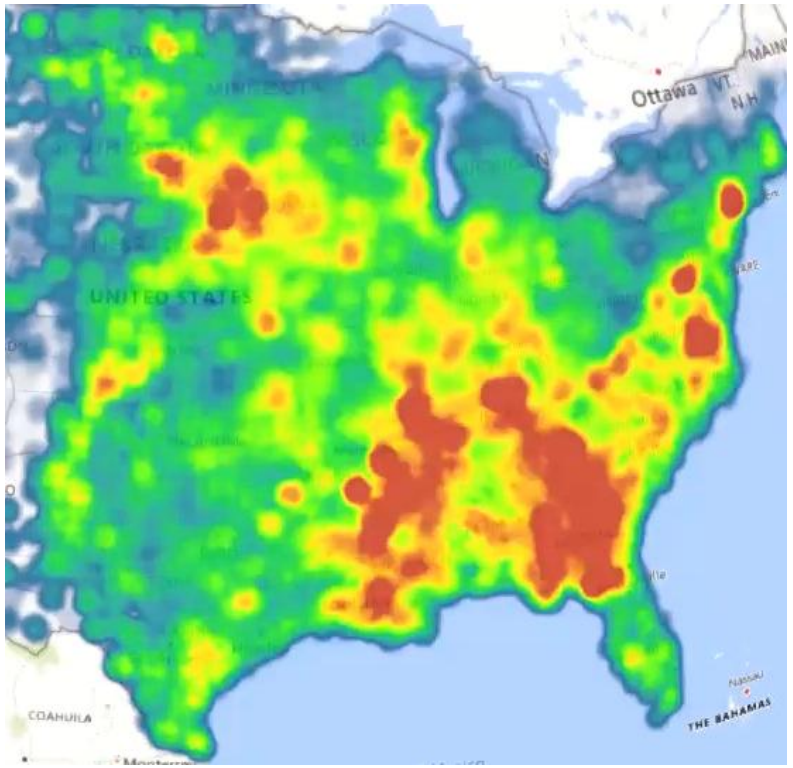
	State
	Coordinates
🔑	Id

EXCEL REPORT DETAILS

Displays the location of the hurricane event using latitude/longitude coordinates

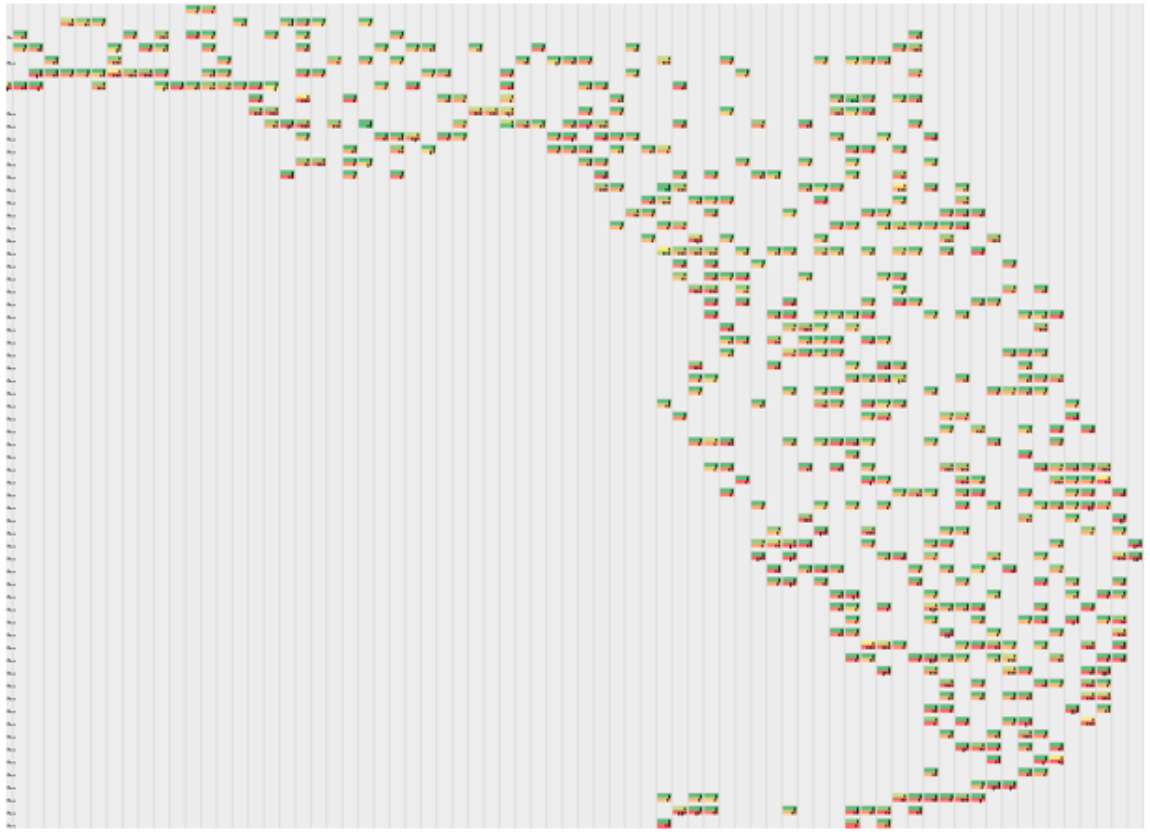
Includes number of times hurricane event occurred in that location and the average wind speed

Uses color coding based on average wind speed and number of times the event happened

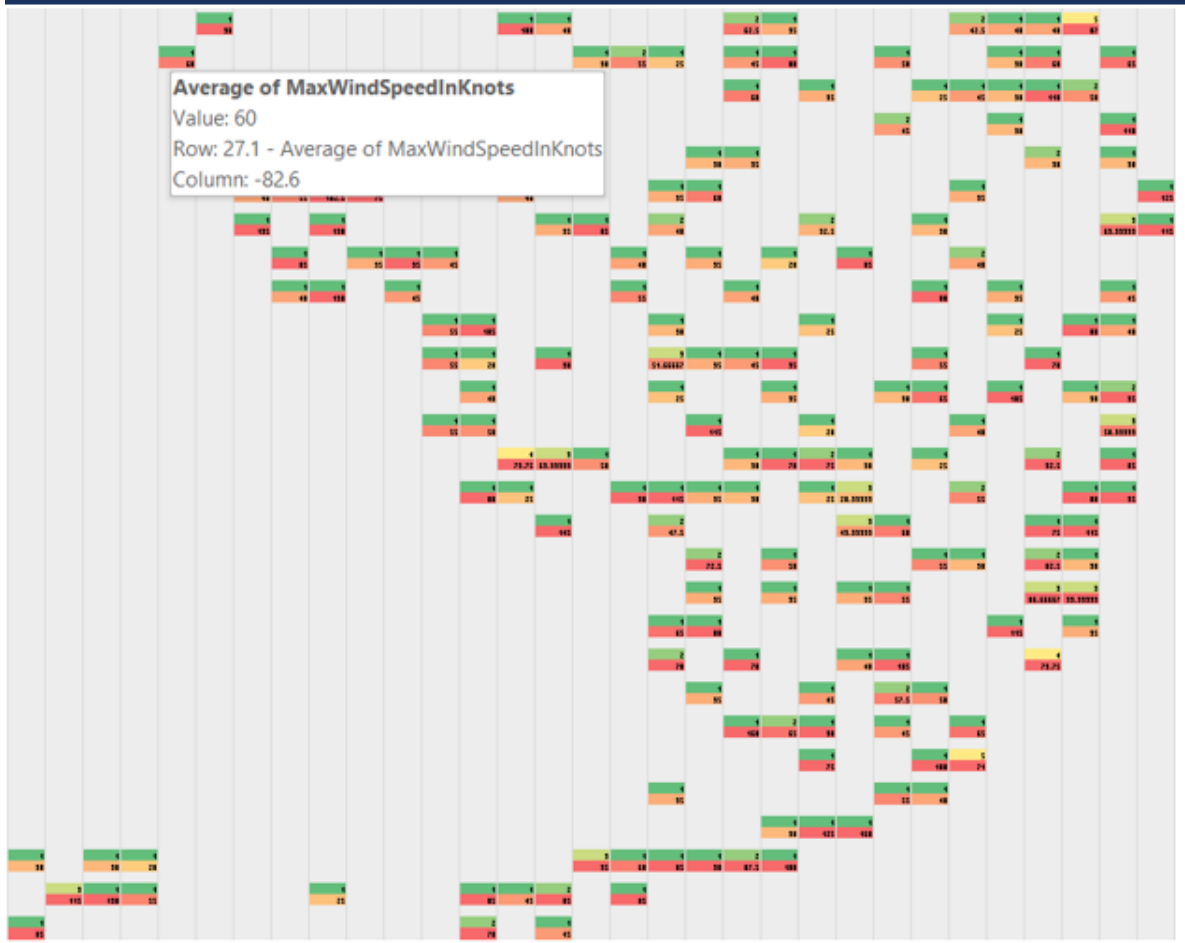


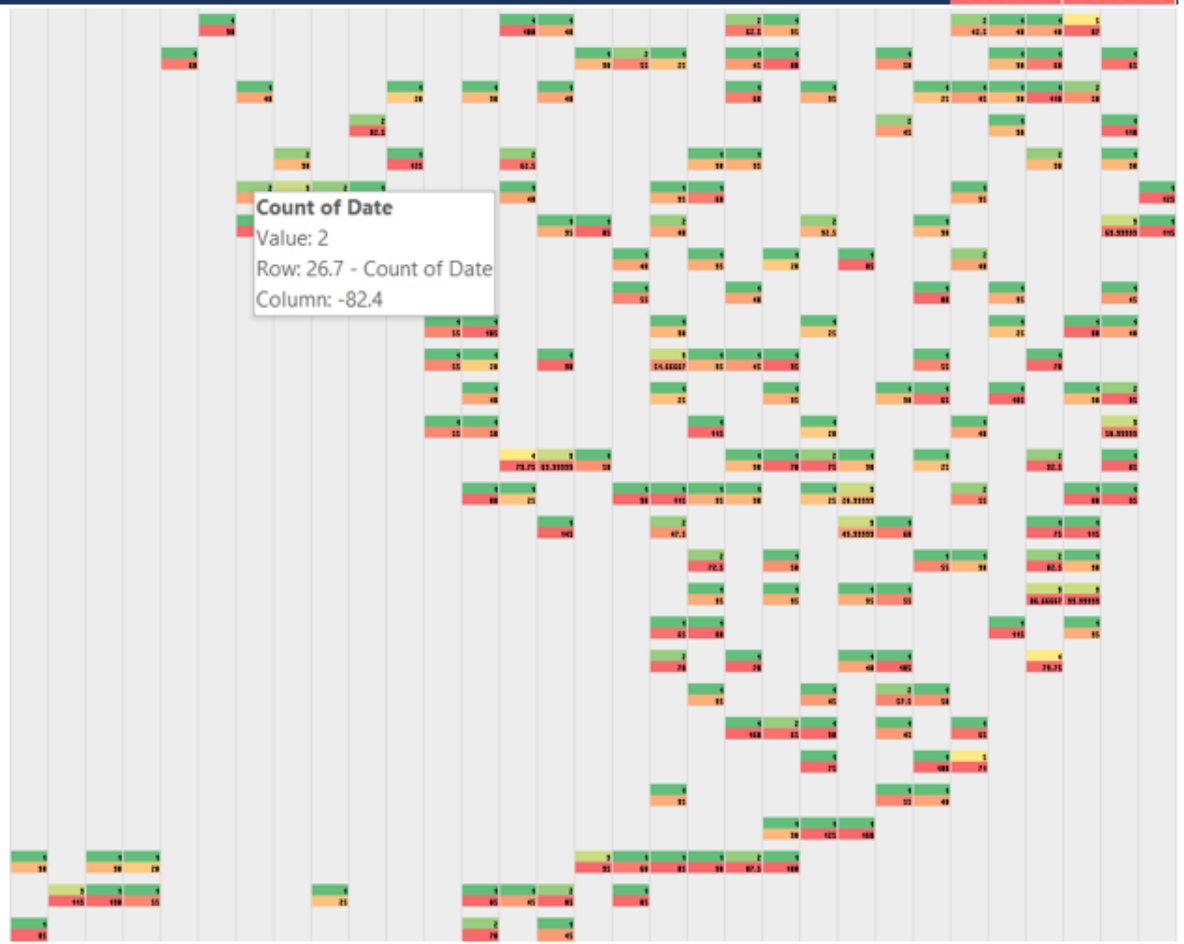
HURRICANE EVENTS EXCEL REPORT

Name	State	Latitude	Longitude	Date	MaxWindSpeedInKnots
ANA	Florida	26	-80.9	06/30/1991 06:00 AM	20
ANA	Florida	26.2	-81.8	06/30/1991 12:00 PM	20
ANA	Florida	26.7	-82.4	06/30/1991 06:00 PM	20
ANA	Florida	27.3	-82.7	07/01/1991 12:00 AM	20
ANA	Florida	28	-82.7	07/01/1991 06:00 AM	20
ANA	Florida	28.7	-82.5	07/01/1991 12:00 PM	20
ANA	Florida	29.3	-82.2	07/01/1991 06:00 PM	20
ANA	Florida	29.9	-81.6	07/02/1991 12:00 AM	20
ANDREW	Florida	25.5	-80.2	08/24/1992 08:40 AM	145
ANDREW	Florida	25.5	-80.3	08/24/1992 09:05 AM	145
ANDREW	Florida	25.6	-81.2	08/24/1992 12:00 PM	115
ALBERTO	Florida	30.4	-86.5	07/03/1994 03:00 PM	55
ALBERTO	Florida	30.7	-86.3	07/03/1994 06:00 PM	45
BERYL	Florida	30	-85.6	08/16/1994 12:00 AM	50
BERYL	Florida	30.2	-85.4	08/16/1994 03:00 AM	50
BERYL	Florida	30.4	-85.3	08/16/1994 06:00 AM	50
GORDON	Florida	24.5	-81.6	11/15/1994 12:00 PM	45
GORDON	Florida	24.6	-81.7	11/15/1994 01:00 PM	45
GORDON	Florida	26.4	-82	11/16/1994 12:00 PM	45
GORDON	Florida	26.5	-81.9	11/16/1994 01:00 PM	45
GORDON	Florida	27.1	-81.4	11/16/1994 06:00 PM	45
GORDON	Florida	28.5	-80.6	11/21/1994 03:00 AM	25
GORDON	Florida	29.2	-81.5	11/21/1994 06:00 AM	20
ALLISON	Florida	29.6	-84.7	06/05/1995 12:00 PM	60



HURRICANE EVENTS EXCEL REPORT – HEAT MAP





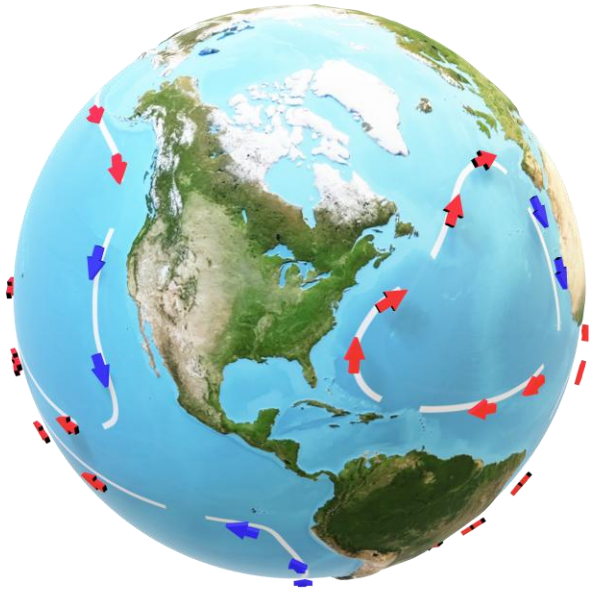
1	1
75	115
2	1
82.5	30
3	3
86.6667	93.3333

EXCEL REPORT DETAILS - 3D MAP

3D Map is embedded into Excel report: no other files are needed

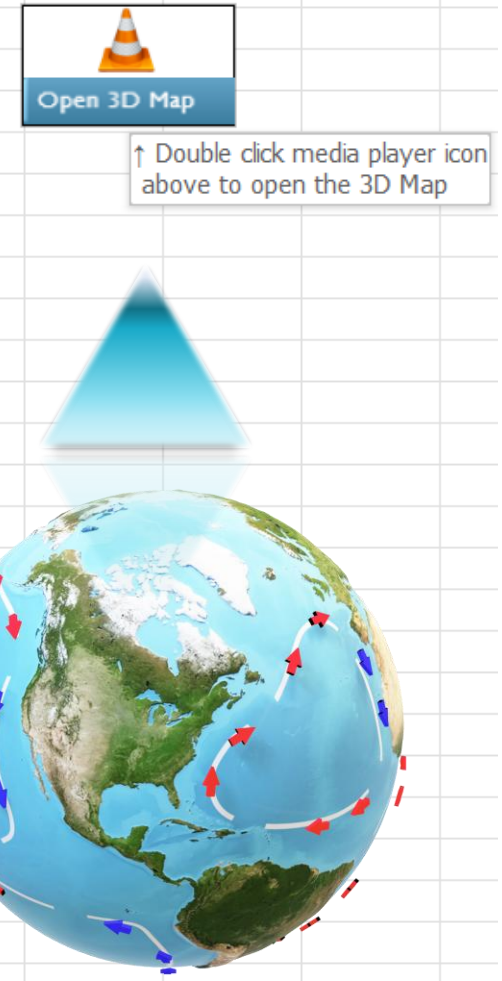
Can be run by clicking on the 3D Map icon in Excel data report tab

Displays the chronological history of hurricane events in the certain US State



HURRICANE EVENTS EXCEL REPORT – 3D MAP

Name	State	Latitude	Longitude	Date	MaxWindSpeedInKnots	MaxWindSpeedInKPH
ABBY	Florida	26.7	-82.3	06/04/1968 12:00 PM	55	101.86
ABBY	Florida	27.4	-81.8	06/04/1968 06:00 PM	45	83.34
ABBY	Florida	28	-81.1	06/05/1968 12:00 AM	45	83.34
ABBY	Florida	28.2	-80.8	06/05/1968 06:00 AM	45	83.34
ABBY	Florida	30.4	-81.4	06/06/1968 10:00 PM	55	101.86
ABBY	Florida	30.6	-81.5	06/07/1968 12:00 AM	50	92.6
AGNES	Florida	30.5	-85.2	06/20/1972 12:00 AM	45	83.34
ALBERTO	Florida	30.4	-86.5	07/03/1994 03:00 PM	55	101.86
ALBERTO	Florida	30.7	-86.3	07/03/1994 06:00 PM	45	83.34
ALBERTO	Florida	29.9	-83.7	06/13/2006 04:30 PM	40	74.08
ALBERTO	Florida	30.3	-83.5	06/13/2006 06:00 PM	35	64.82
ALBERTO	Florida	30.3	-86	05/28/2018 09:00 PM	40	74.08
ALBERTO	Florida	30.9	-86.1	05/29/2018 12:00 AM	30	55.56
ALEX	Florida	27.2	-80.4	06/04/2022 06:00 PM	40	74.08
ALICE	Florida	30.3	-85.9	06/06/1953 05:00 PM	40	74.08
ALICE	Florida	30.4	-85.9	06/06/1953 06:00 PM	40	74.08
ALICE	Florida	30.8	-85.8	06/07/1953 12:00 AM	25	46.3
ALLISON	Florida	29.9	-84.4	06/05/1995 02:00 PM	60	111.12
ALLISON	Florida	30.1	-84.2	06/05/1995 03:00 PM	55	101.86
ALMA	Florida	26.8	-80.1	08/26/1962 06:00 PM	30	55.56
ALMA	Florida	30.1	-84.2	06/09/1966 09:00 PM	75	138.9
ALMA	Florida	30.4	-84	06/10/1966 12:00 AM	60	111.12
ALMA	Florida	29.5	-82.9	05/25/1970 06:00 AM	30	55.56
ALPHA	Florida	30.5	-83	05/28/1972 06:00 AM	30	55.56



HURRICANE EVENTS EXCEL REPORT – 3D MAP

THANK YOU

VLAD KOVAL
VKOVAL@GMAIL.COM