

Module 4

Using the Custom Domain Option



Module Overview

- Relevant inputs for a custom domain run
- Using the zone and zoneroad inputs to divide activity between areas
- Exercise: run a simple custom domain for a hypothetical five-county area

Selecting a Custom Domain

The screenshot shows the MOVES software interface with the following components:

- Menu Bar:** File, Edit, Pre Processing, Action, Post Processing, Tools, Settings, Help
- Left Panel (Navigation):** A list of features with checkmarks and expand/collapse icons:
 - Description
 - Scale
 - Time Spans
 - Geographic Bounds (with a pink exclamation mark)
 - Vehicles/Equipment (expanded)
 - On Road Vehicle Equipment
 - Road Type
 - Pollutants And Processes
 - Manage Input Data Sets
 - Strategies (expanded)
 - Rate Of Progress
 - Output (expanded)
 - General Output
 - Output Emissions Detail
 - Advanced Performance Features
- Main Panel (Configuration):**
 - Region:** Radio buttons for Nation, State, County, Zone & Link, and **Custom Domain** (highlighted with a yellow box).
 - Generic County:** A sub-panel with fields for State ID (99), County ID (1), Description, GPA Fraction (0.0), Bar. Pressure, Vapor Adjust (0.0), and Spill Adjust (0.0).
 - Domain Input Database:** A sub-panel with a text box for the server (localhost), a dropdown for the database (lake_2015_training_in), and buttons for Refresh and Enter/Edit Data.
 - Geographic Bounds Requirements:** A large empty text box.
- Status Bar:** Select and Import County-Level Data

Geographic Bounds Inputs

- CountyID (stateID for custom domain is always 99)
 - Usually 1 (FIPs code of 99001)
- Description (optional)
- GPA Fraction
- Barometric Pressure (low altitude = 28.9, high altitude = 24.6)
- Vapor Adjust
- Spill Adjust

Using “Zones”

- A custom domain can be dividing into one or more “zones” of unique vehicle activity
 - As an example, we’ll model a custom domain with five zones representing individual counties
- VMT, starts, hotelling, and parked (evap) activity can be allocated across user-defined zones
- Meteorological conditions can also vary across zones
- Age distribution, fuels, speed distribution, ramp fraction, I/M program, and road type distribution are uniform across all zones

County Data Manager Inputs

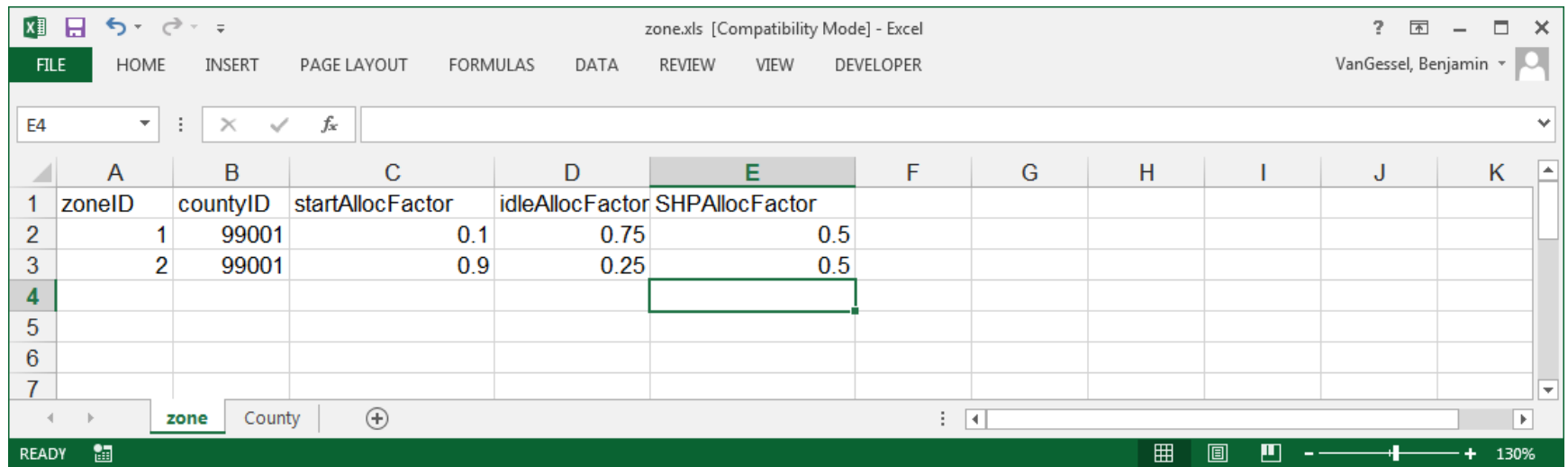
- Relevant for Custom Domain
 - Zone
 - Zoneroad
 - ZoneSCC
 - Meteorology
- Plus all other inputs (VMT, fuels, ramp fraction, etc.)

Zone Input

- Used to allocate off-network activity to each zone
- User enters allocation for starts (startallocfactor), hotelling (idleallocfactor), and parking (SHPallocfactor)
 - Must sum to one for all zones

Zone Input

- The above example shows a custom domain with two zones
 - Starts are mostly occurring in zone 2, while hotelling primarily occurs in zone 1
 - Vehicle hours parked are equally divided between zones 1 and 2



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K
1	zoneID	countyID	startAllocFactor	idleAllocFactor	SHPAllocFactor						
2	1	99001	0.1	0.75	0.5						
3	2	99001	0.9	0.25	0.5						
4											
5											
6											
7											

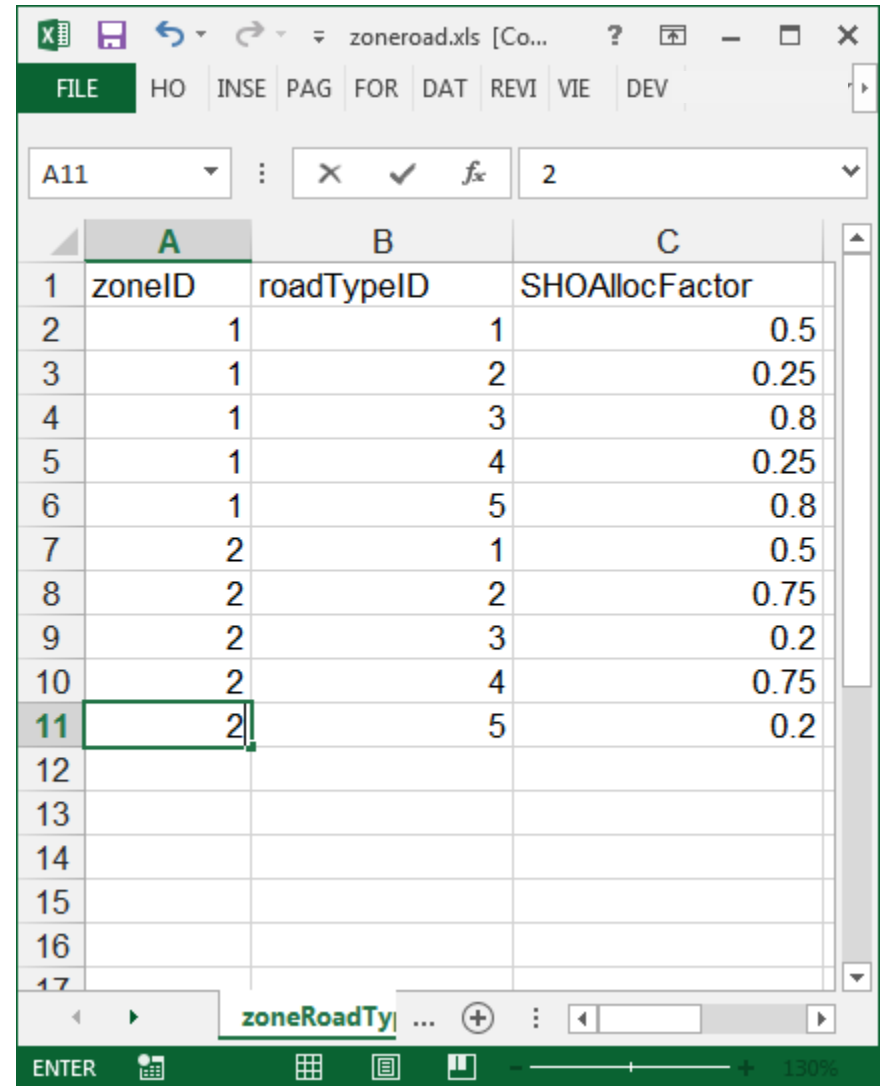
The spreadsheet interface includes the ribbon (FILE, HOME, INSERT, PAGE LAYOUT, FORMULAS, DATA, REVIEW, VIEW, DEVELOPER), the formula bar (E4), and the status bar (READY, 130%).

Zoneroad Input

- Used to vary on-road activity by road type and zone
- User enters source hours operating fraction (SHOallocfactor)
- Some zones may have more source hours operating (SHO)
- Also, some zones may have more highway/freeway SHO than arterial SHO
- Must sum to one for each road type

Zoneroad Input

- The example shows two zones with different distributions of SHO
- Freeway/highway SHO is mostly in zone 1 while the majority of arterial SHO occurs in zone 2



	A	B	C
	zoneID	roadTypeID	SHOAllocFactor
1			
2	1	1	0.5
3	1	2	0.25
4	1	3	0.8
5	1	4	0.25
6	1	5	0.8
7	2	1	0.5
8	2	2	0.75
9	2	3	0.2
10	2	4	0.75
11	2	5	0.2
12			
13			
14			
15			
16			
17			

Using Travel Model Data to Develop Zone and Zoneroad Inputs

- Map model travel analysis zones (TAZs) to the zones used in MOVES run
- Zone input:
 - Sum trip origins for all TAZs within a MOVES zone, and calculate startAllocFactor by zone
 - Sum trip ends for all TAZs within a MOVES zone, and calculate SHPAllocFactor by zone
- Zoneroad input:
 - Map travel model road types to MOVES roadtypes
 - Sum VHT by MOVES roadtype within each MOVES zone, and then calculate SHOAllocFactor for each zone

ZoneSCC

- Used to map MOVES road types to SCC road types
- Only required when selecting SCC output in runspec
- SIP and Regional Conformity analyses should not use SCC output and therefore should skip this input

Meteorology

- Temperature and humidity can vary by zone
- Reference county inventory discussion for guidance on selecting meteorological data sources for MOVES

Meteorology

- The example shows two zones with different meteorology
- Only one hour is shown, but typically a 24-hour profile would be entered for each month, and zone being modeled

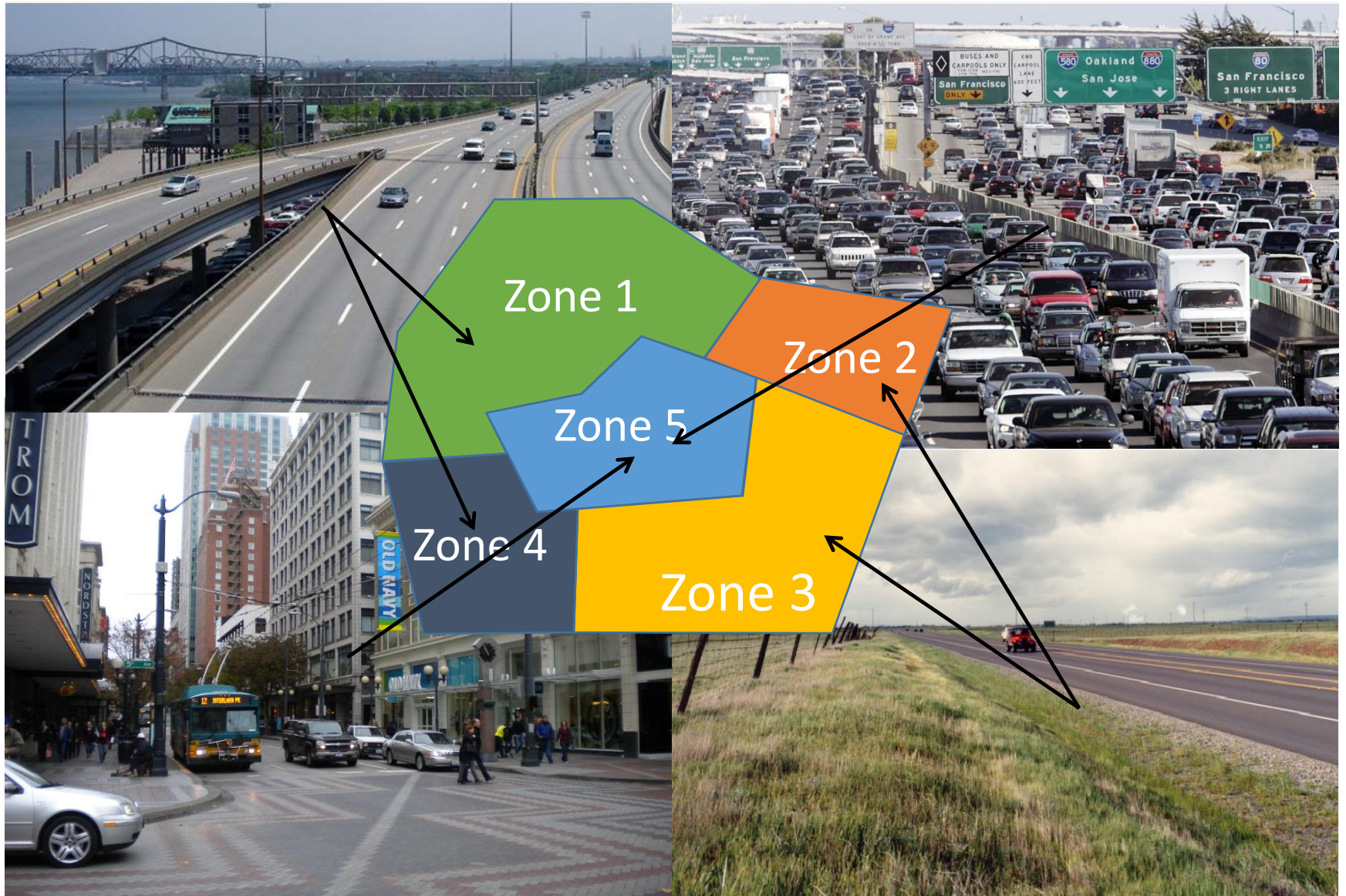
The screenshot shows an Excel spreadsheet with the following data:

monthID	zoneID	hourID	temperature	relHumidity
7	1	1	46.3	56.3
7	2	1	66.3	78.4

Custom Domain Exercise

- Our exercise scenario is a five county non-attainment area – custom domain with five zones
 - Area shares the same age distribution, fuels, I/M, road type distribution, ramp fraction, and speed distribution
- Four suburban counties (zones 1-4) and one urban county (zone 5)
- Significant number of trips begin and end within zone 5 – many starts, high arterial VMT
- Most freeway activity and extended idling occurs in surrounding rural counties
- Zone 1 has different temperature profile

Exercise Scenario - Geographic Orientation



Load RunSpec

- Open Custom.mrs
- Fill out Geographic bounds panel
 - CountyID - 1
 - Description – five county area
 - GPA Fraction – 0.0
 - Barometric Pressure – 28.9
 - Vapor Adjust – 0.0
 - Spill Adjust – 0.0
- Create input database – “custom_domain_in”
- Load pre-populated input files from custom domain folder
- Export Zone and ZoneRoad templates

Populate Zone Input

- Zones 1, 2, 3, and 4
 - Suburban counties with 40% share of starts – split evenly between four zones (startallocfactor)
 - Contain 100% of hotelling– split evenly between four zones (idleallocfactor)
 - Zone 1 contains 10% of parked activity, zone 2, 3, and 4 contain 60% of activity – split evenly between three zones (SHPallocfactor)
- Zone 5
 - Urban core contains 60% of starts (startallocfactor)
 - Zero % hotelling (idleallocfactor)
 - 30% parked activity (SHPallocfactor)

Completed Zone Input

zone.xls [Compatibility Mode] - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER

F1

	A	B	C	D	E	F	G	H	I	J	K
1	zoneID	countyID	startAllocFactor	idleAllocFactor	SHPAllocFactor						
2	1	99001	0.1	0.25	0.1						
3	2	99001	0.1	0.25	0.2						
4	3	99001	0.1	0.25	0.2						
5	4	99001	0.1	0.25	0.2						
6	5	99001	0.6	0	0.3						
7											

zone County

READY 130%

Populate ZoneRoad Input

- RoadTypeID 1 – Off-network (ignored by MOVES)
 - 20% to each zone
- RoadTypeID 2 – Rural Restricted
 - 25% to zones 1,2,3,4 and 0% to zone 5
- RoadTypeID 3 – Rural Unrestricted
 - 25% to zones 1,2,3,4 and 0% to zone 5
- RoadTypeID 4 – Urban Restricted
 - 22.5% to zones 1,2,3,4 and 10% to zone 5
- RoadTypeID 5 – Urban Unrestricted
 - 5% to zones 1,2,3,4 and 80% to zone 5

Completed ZoneRoad Input

The screenshot displays an Excel spreadsheet titled 'zoneroad.xls [Compatibility Mode] - Excel'. The spreadsheet has columns labeled A through L and rows numbered 1 through 28. The data is organized into three columns: 'zoneID' (Column A), 'roadTypeID' (Column B), and 'SHOAllocFactor' (Column C). The 'SHOAllocFactor' values range from 0 to 0.8. The status bar at the bottom indicates the current selection is 'zoneRoadType' and 'RoadType'.

Row	zoneID	roadTypeID	SHOAllocFactor
1	1	1	0.2
2	2	1	0.2
3	3	1	0.2
4	4	1	0.2
5	5	1	0.2
6	1	2	0.25
7	2	2	0.25
8	3	2	0.25
9	4	2	0.25
10	5	2	0.25
11	1	3	0.25
12	2	3	0.25
13	3	3	0.25
14	4	3	0.25
15	5	3	0.25
16	1	4	0.225
17	2	4	0.225
18	3	4	0.225
19	4	4	0.225
20	5	4	0.1
21	1	5	0.05
22	2	5	0.05
23	3	5	0.05
24	4	5	0.05
25	5	5	0.8
26			
27			
28			

Meteorology

- Diurnal Profiles can be varied by zoneID
- For the Custom Domain exercise, zoneID 1 has a temperature profile ~20 degree F cooler than zones 2-5

	A	B	C	D	E	F	G	H
1	monthID	zoneID	hourID	temperatu	relHumidity			
2	7	1	1	46.3	56.3			
3	7	1	2	45	55			
4	7	1	3	43.9	53.9			
5	7	1	4	42.9	52.9			
6	7	1	5	42.1	52.1			
7	7	1	6	41.3	51.3			
8	7	1	7	41.6	51.6			
9	7	1	8	45	55			
10	7	1	9	49.2	59.2			
11	7	1	10	53	63			
12	7	1	11	56.1	66.1			
13	7	1	12	58.6	68.6			
14	7	1	13	60.4	70.4			
15	7	1	14	61.9	71.9			
16	7	1	15	62.9	72.9			
17	7	1	16	63.3	73.3			
18	7	1	17	63.3	73.3			
19	7	1	18	62.6	72.6			
20	7	1	19	61.2	71.2			
21	7	1	20	59	69			
22	7	1	21	55.3	65.3			
23	7	1	22	51.7	61.7			
24	7	1	23	49.6	59.6			
25	7	1	24	47.9	57.9			
26	7	2	1	66.3	78.4			
27	7	2	2	66.3	78.4			

Close CDM, run MOVES, open output

The screenshot shows the MySQL Workbench interface. The main window displays a query result for the 'movesoutput' table. The query is: `SELECT * FROM custom_domain_out.movesoutput;`

The result set contains 5 rows of data. The columns are: MOVESRunID, iterationID, yearID, monthID, dayID, stateID, countyID, zoneID, pollutantID, and emissionQuant. The pollutantID column contains masked values (XXXXXXXXXX).

MOVESRunID	iterationID	yearID	monthID	dayID	stateID	countyID	zoneID	pollutantID	emissionQuant
1	1	2015	7	5	99	99001	5	XXXXXXXXXX	1127100
1	1	2015	7	5	99	99001	4	XXXXXXXXXX	183856
1	1	2015	7	5	99	99001	3	XXXXXXXXXX	183856
1	1	2015	7	5	99	99001	2	XXXXXXXXXX	183856
1	1	2015	7	5	99	99001	1	XXXXXXXXXX	195530

The left sidebar shows the Navigator pane with the 'custom_domain_out' schema selected, and the 'movesoutput' table highlighted. The Information pane at the bottom left shows the table structure for 'movesoutput':

Table: movesoutput

Columns:

- MOVESRunID smallint(5) UN
- iterationID smallint(5) UN
- yearID smallint(5) UN
- monthID smallint(5) UN
- dayID smallint(5) UN
- hourID smallint(5) UN
- stateID smallint(5) UN
- countyID int(10) UN
- zoneID int(10) UN
- pollutantID int(10) UN
- emissionQuant int(10) UN

Questions?

