

Custom printed OSM maps: Public transport and beyond

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Custom printed OSM maps:
Public transport and beyond

Printed stop information

- Ideal
 - Schedule
 - Strip map
 - Geographical map
- Reality
 - Poor presentation
 - Partial information
 - Outdated information
 - Expensive updates

Poor schedules

STT		ORARIO DEI PASSAGGI			
FERMATA N. 380		Validità dal 01-07-2011			
LINEA 10		da lun. a ven.	sabato	gg.festivi	
PRIMO PASSAGGIO		5.05	5.05		
INTERVALLI DEI PASSAGGI (minuti)	→ 7.00	13	12	-	
	7.00 → 8.30	6	9	-	
	8.30 → 12.00	7	9	-	
	12.00 → 14.30	7	9	-	
	14.30 → 19.15	7	9	-	
		19.15 → 20.00	7-11	12-14	-
PASSAGGI SERALI		20.19	22.55	20.19	22.55
		20.45	23.20	20.45	23.20
		21.05	23.44	21.05	23.44
		21.27	0.06	21.27	0.06
		21.49	0.28	21.49	0.28
		22.12	1.07	22.12	1.07
		22.35	1.37	22.35	1.37
LINEA 10F		da lun. a ven.	sabato	gg.festivi	
PRIMO PASSAGGIO				5.39	
INTERVALLI DEI PASSAGGI (minuti)	→ 7.00	-	-	21	
	7.00 → 8.30	-	-	21	
	8.30 → 12.00	-	-	14	
	12.00 → 14.30	-	-	14	
	14.30 → 19.15	-	-	14	
		19.15 → 20.00	-	14-18	
PASSAGGI SERALI				20.26	23.07
				20.48	23.24
				21.10	23.46
				21.34	0.09
				21.54	0.30
				22.16	0.53
				22.41	1.23

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Poor schedules

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	12,00 → 14,30	7	9		
	14,30 → 19,15	7	9		
	19,15 → 20,00	7-11	12-14		
PASSAGGI SERALI		20.19	22.55	20.19	22.55
		20.45	23.20	20.45	23.20
		21.05	23.44	21.05	23.44
		21.27	0.06	21.27	0.06
		21.49	0.28	21.49	0.28
		22.12	1.07	22.12	1.07
		22.35	1.37	22.35	1.37
LINEA 10F		da lun. a ven.	sabato	gg.festivi	
PRIMO PASSAGGIO				5.39	
INTERVALLI DEI PASSAGGI (minuti)	→ 7,00	-	-	21	
	7,00 → 8,30	-	-	21	
	8,30 → 12,00	-	-	14	
	12,00 → 14,30	-	-	14	
	14,30 → 19,15	-	-	14	
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PASSAGGI SERALI				20.26	23.07
				20.48	23.24
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Poor schedules

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PASSAGGI SERALI		20.19	22.55	20.19	22.55
		20.45	23.20	20.45	23.20
		21.05	23.44	21.05	23.44
		21.27	0.06	21.27	0.06
		21.49	0.28	21.49	0.28
		22.12	1.07	22.12	1.07
		22.35	1.37	22.35	1.37
LINEA 10F		da lun. a ven.	sabato	gg.festivi	
PRIMO PASSAGGIO				5.30	
INTERVALLI DEI PASSAGGI (minuti)	→ 7.00	-	-	21	
	7.00 → 8.30	-	-	21	
	8.30 → 12.00	-	-	14	
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PASSAGGI SERALI				20.26	23.07
				20.48	23.24
				21.10	23.46
				21.34	0.09
				21.54	0.30
				22.16	0.53
				22.41	1.23

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Poor schedules

 94		P.TA VOLTA - CADORNA FN Fermata Colonne di S. Lorenzo Orario in vigore dal 06/09/2010	
<i>Da Lunedì a Venerdì</i>		<i>Sabato</i>	<i>Festivo</i>
Ore	frequenza/passaggi	Ore	frequenza/passaggi
3		3	
4		4	
5		5	
6	Dalle 6:17 ogni 11'	6	Dalle 6:17 ogni 11'
7	Ogni 5'	7	Ogni 8'
8	Ogni 3'	8	Ogni 7'
9	Ogni 4' [9:04*:15*]	9	Ogni 7'
10	Ogni 5'	10	Ogni 7'
11	Ogni 5'	11	Ogni 7'
12	Ogni 5'	12	Ogni 7'
13	Ogni 4'	13	Ogni 7'
14	Ogni 4' [14:29*]	14	Ogni 7'
15	Ogni 5'	15	Ogni 8'
16	Ogni 5'	16	Ogni 7'
17	Ogni 4'	17	Ogni 7'
18	Ogni 4'	18	Ogni 7'
19	01 05 09* 13 17 21 25* 28 32* 35 39 43* 47	19	Ogni 8' [19:48*]
20	Ogni 7' [20:03*:25*:41*]	20	08 19 34 49
21	09* 19 33 48	21	03 18 33 48
22	03 18 33 48	22	03 18 33 48
23	03 18 33 48	23	03 18 33 48
0	08 28 48	0	08 28 48
1		1	
2		2	

Note: * Limita a Cadorna M1 M2

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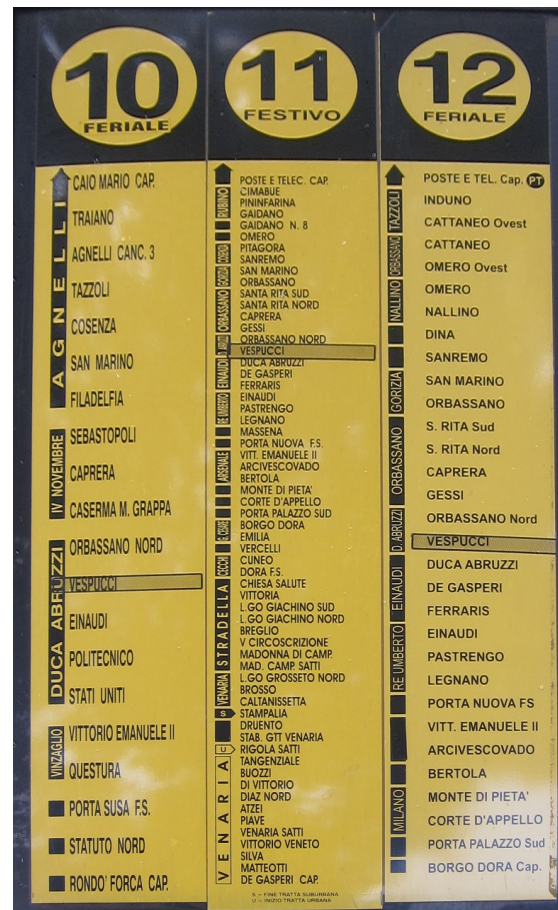
Poor schedules

 94				P.TA VOLTA - CADORNA FN				Fermata Colonne di S. Lorenzo				Orario in vigore dal 06/09/2010			
<i>Da Lunedì a Venerdì</i>				<i>Sabato</i>				<i>Festivo</i>							
Ore	frequenza/passaggi			Ore	frequenza/passaggi			Ore	frequenza/passaggi						
3				3				3							
4				4				4							
5				5				5							
6	Dalle 6:17 ogni 11'			6	Dalle 6:17 ogni 11'			6	17 38						
7	Ogni 5'			7	Ogni 8'			7	00 17 32 47						
8	Ogni 3'			8	Ogni 7'			8	02 17 32 47						
9	Ogni 4' [9:04*:15*]			9	Ogni 7'			9	02 18 34 49						
10	Ogni 5'			10	Ogni 7'			10	05 20 35 50						
11	Ogni 5'			11	Ogni 7'			11	05 20 35 50						
12	Ogni 5'			12	Ogni 7'			12	05 20 35 50						
13	Ogni 4'			13	Ogni 7'			13	05 20 35 50						
14	Ogni 4' [14:29*]			14	Ogni 7'			14	05 20 33 43 53						
15	Ogni 5'			15	Ogni 8'			15	ogni 10'						
16	Ogni 5'			16	Ogni 7'			16	ogni 10'						
17	Ogni 4'			17	Ogni 7'			17	ogni 10'						
18	Ogni 4'			18	Ogni 7'			18	ogni 11'						
19	01 05 09* 13 17 21 25* 28 32* 35 39 43* 4:			19	Ogni 8' [19:48*]			19	Ogni 11' [19:57*]						
20	Ogni 7' [20:03*:25*:41*]			20	08 19 34 49			20	08 20 34 48						
21	09* 19 33 48			21	03 18 33 48			21	03 18 33 48						
22	03 18 33 48			22	03 18 33 48			22	03 18 33 48						
23	03 18 33 48			23	03 18 33 48			23	03 18 33 48						
0	08 28 48			0	08 28 48			0	08 28 48						
1				1				1							
2				2				2							

Note: * Limita a Cadorna M1 M2

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Poor strip maps



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Poor strip maps

Orario dal 13/06/11 al 18/09/11
20 SAMPIERDARENA Vittorio Veneto

Feriale	Sabato	Festivo
Frequenze		
6'/11'	7'/11'	12'/15'
Primi transiti		
4.40	4.40	4.39
5.10	5.10	5.09
5.40	5.40	5.39
Ultimi transiti		
20.17	20.17	20.14
20.27	20.27	20.25
20.38	20.38	20.37

Punti d'interesse

☐ **SERVIZI / SERVICE:** 1. Comune - Cso. Torino 2. Comune - Matitone 3. Comune - Palazzo Tursi 5. Prefettura 9. Agenzia delle Entrate

☐ **CULTURA / CULTURE:** 3. Palazzo Reale 4. Palazzo Rosso 7. Accademia di Belle Arti 11. Museo Arte Orientale Chiossone 12. Museo del Risorgimento e di Mazzini 23. Biblioteca Gallino 31. Teatro della Corte 32. Teatro Duse 33. Teatro Politeama 34. Teatro Carlo Felice

☐ **MONUMENTI / MONUMENTS:** 2. Palazzo Ducale 4. San Lorenzo

0294 VIA XX SETTEMBRE 13/MERCATO

FOCE - Rimassa

- TORINO 1 - Ruspoli
- TORINO 2 - Barabino
- BUENOS AIRES 1 - Da Novi
- BUENOS AIRES 2 - Lambruschini
- CADORNA - Piazza Della Vittoria
- XX SETTEMBRE 1 - Merc. Orientale
- XX SETTEMBRE 2 - Portoria
- XX SETTEMBRE 3 - De Ferrari
- DE FERRARI - Metro'
- ROMA - Corvetto
- PORTELLO - Caffaro
- ZECCA
- BALBI 1 - Universita'
- BALBI 2 - Santa Brigida
- PRINCIPE FS
- DORIA - Metro' Principe
- SAN BENEDETTO - Amba Alagi
- BUOZZI 1 - Piazza San Teodoro
- BUOZZI 2 - Metro' Dinegro
- FRANCIA 2 - Matitone
- FRANCIA 3 - Stazione Fs
- BURANELLO 1 - Barabino
- BURANELLO 2 - Giovanetti
- SAMPIERDARENA - Vittorio Veneto

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Poor strip maps

Orario dal 13/06/11 al 18/09/11

20 SAMPIERDARENA Vittorio Veneto

Feriale	Sabato	Festivo
Frequenze		
6'/11'	7'/11'	12'/15'
Primi transiti		
4.40	4.40	4.39
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Ultimi transiti		
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ZECCA

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BUOZZI 2 - Metro' Dinegro

FRANCIA 2 - Matitone

FRANCIA 3 - Stazione Fs

BURANELLO 1 - Barabino

BURANELLO 2 - Giovanetti

SAMPIERDARENA - Vittorio Veneto

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Poor strip maps

Orario dal 13/06/11 al 18/09/11
20 SAMPIERDARENA Vittorio Veneto

Feriale	Sabato	Festivo
Frequenze		
6'/11'	7'/11'	12'/15'
Primi transiti		
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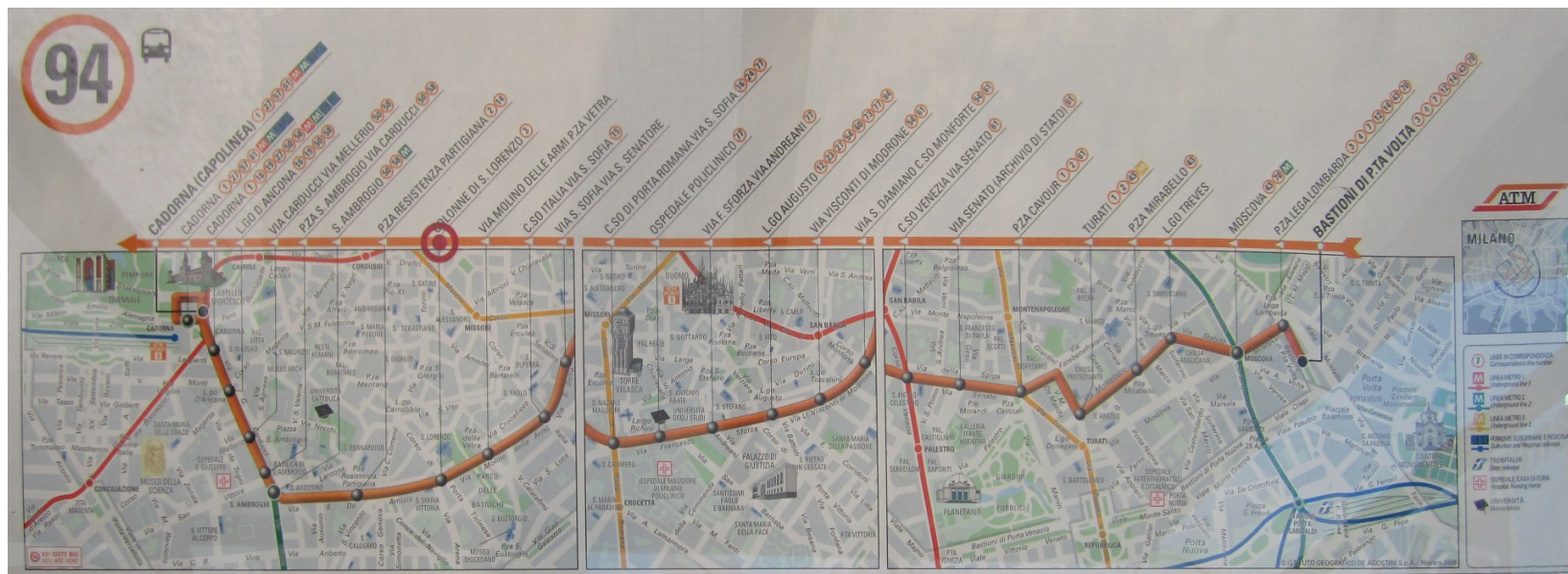
FOCE - Rimassa

- TORINO 1 - Ruspoli
- TORINO 2 - Barabino
- BUENOS AIRES 1 - Da Novi
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- BURANELLO 1 - Barabino
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- SAMPIERDARENA - Vittorio Veneto

0294 VIA XX SETTEMBRE 13/MERCATO

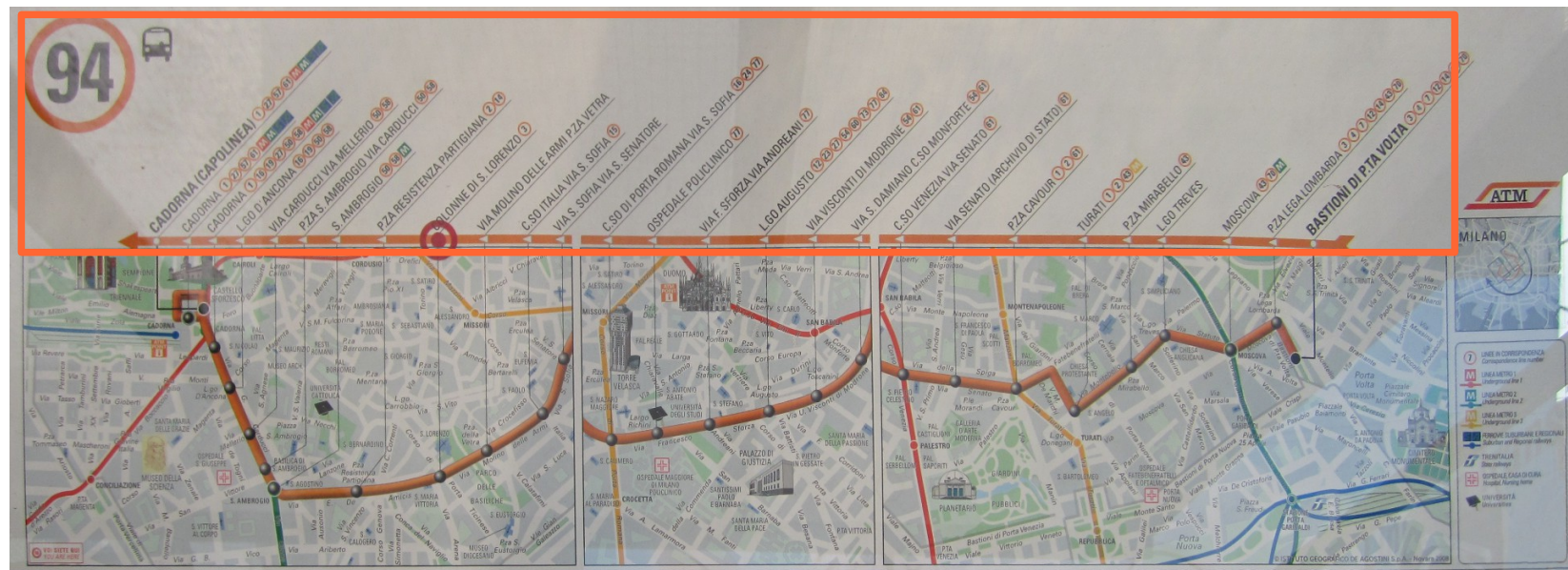
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Poor maps



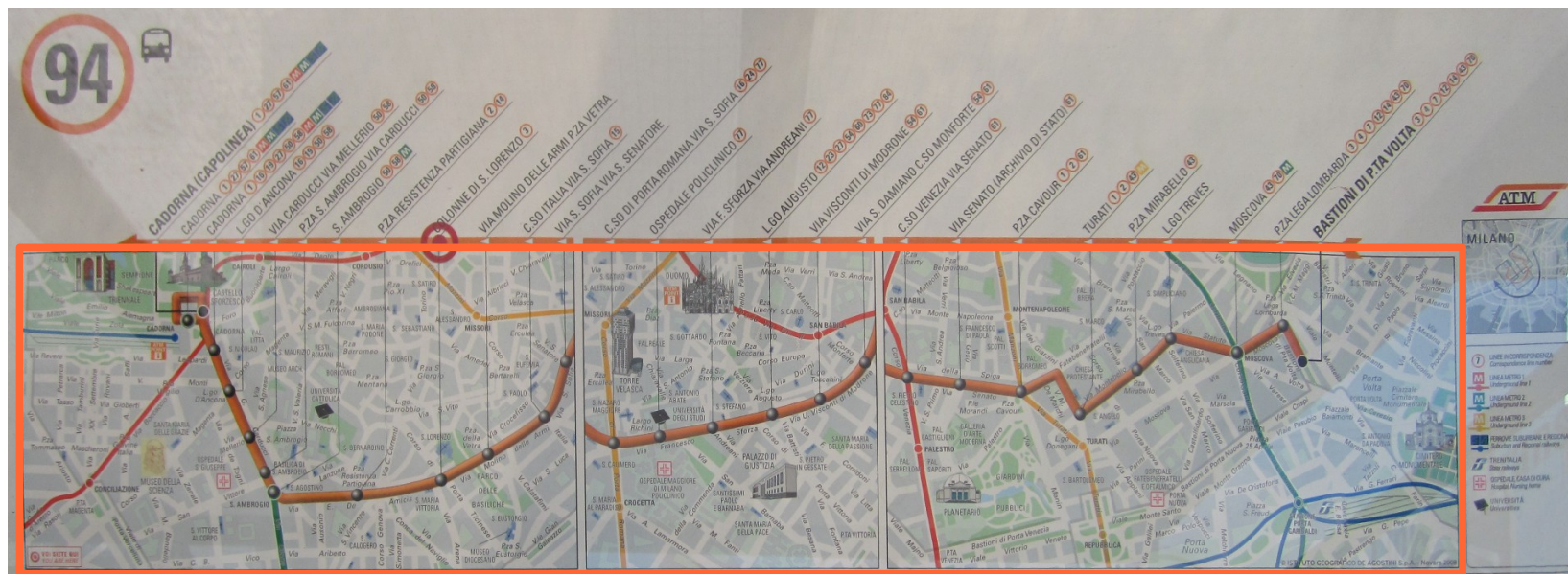
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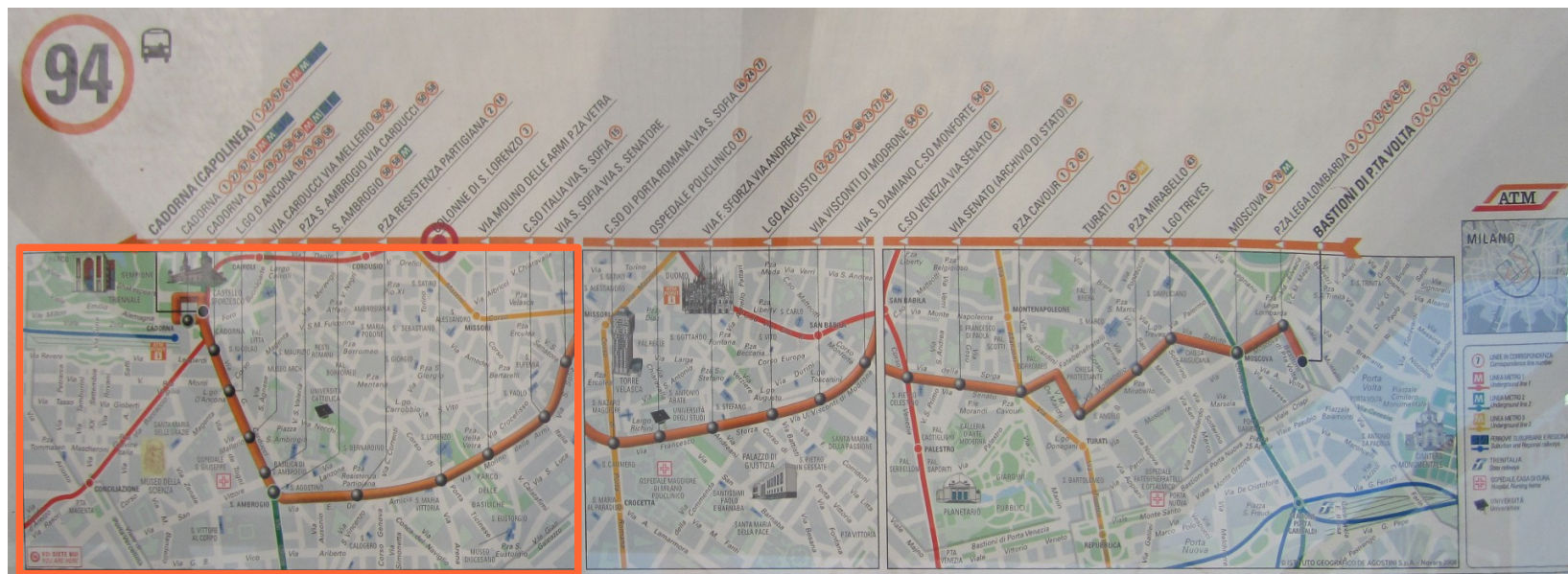
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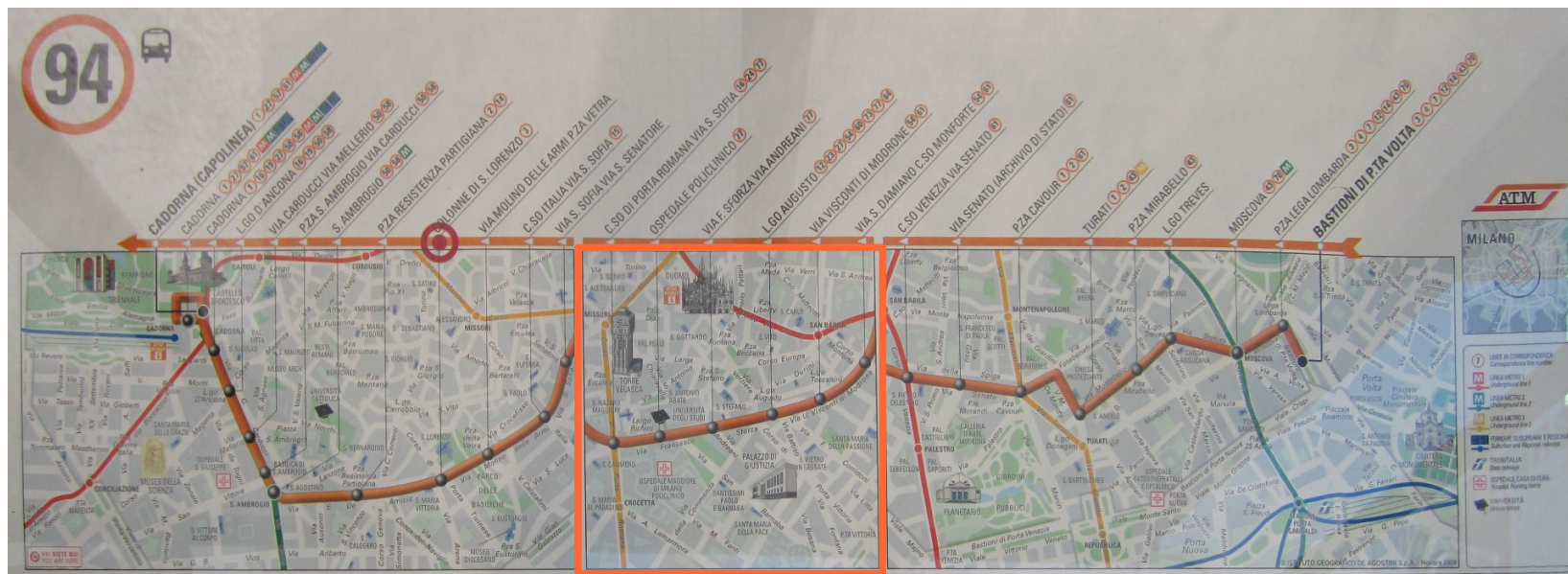
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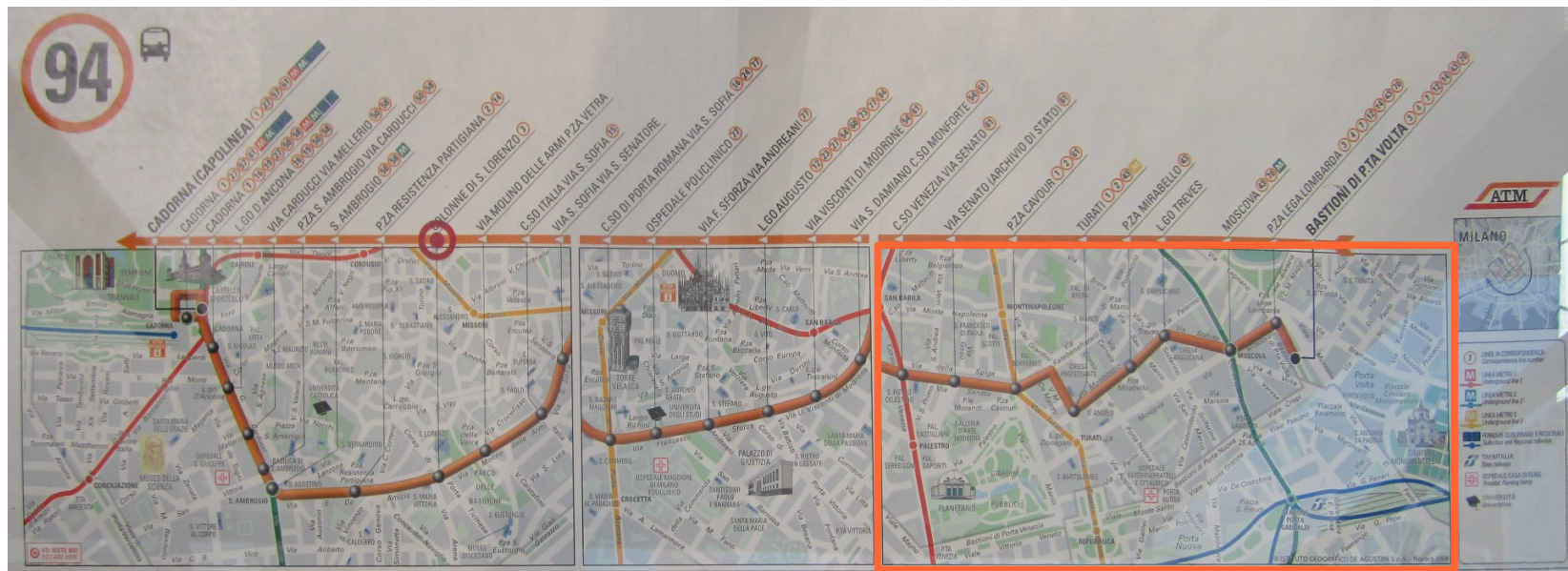
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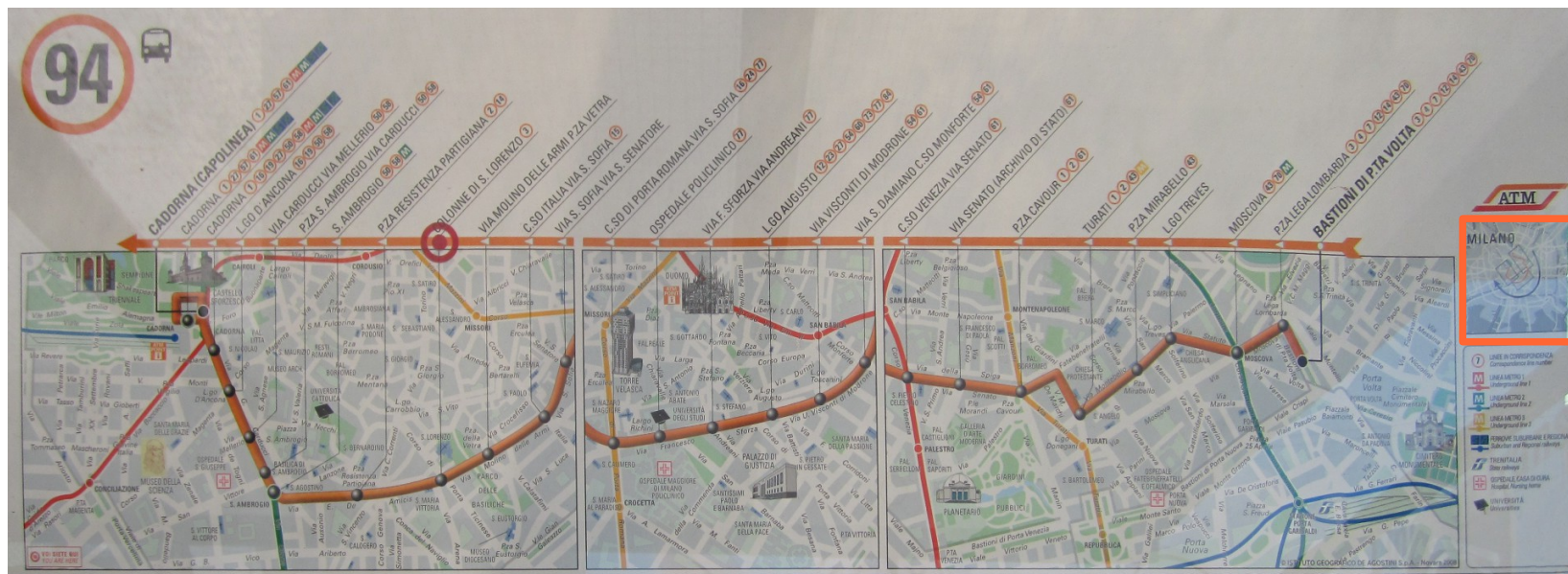
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Poor maps



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Poor maps



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Expensive to maintain maps



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Information sources

- Transport operator
 - Stops and routes → Operational details
 - Transport network context
 - Infrequent updates
- OSM
 - Stops and routes → Geographical details
 - Geographical context
 - Continuous updates

Information presentation

- Printed stop placards
 - Schedule
 - Strip map
 - Overview map
 - Close-up map
- Using operator and OSM data
 - Driven by changes to operator data
 - Incorporating changes to OSM data

Placard generation

- Automatic
 - No manual map layout
 - No manual selection of map regions
 - Fast and inexpensive updates
 - No manual ability to fix problems
- Components combining operator and OSM data
 - Strip map
 - Overview and close-up maps

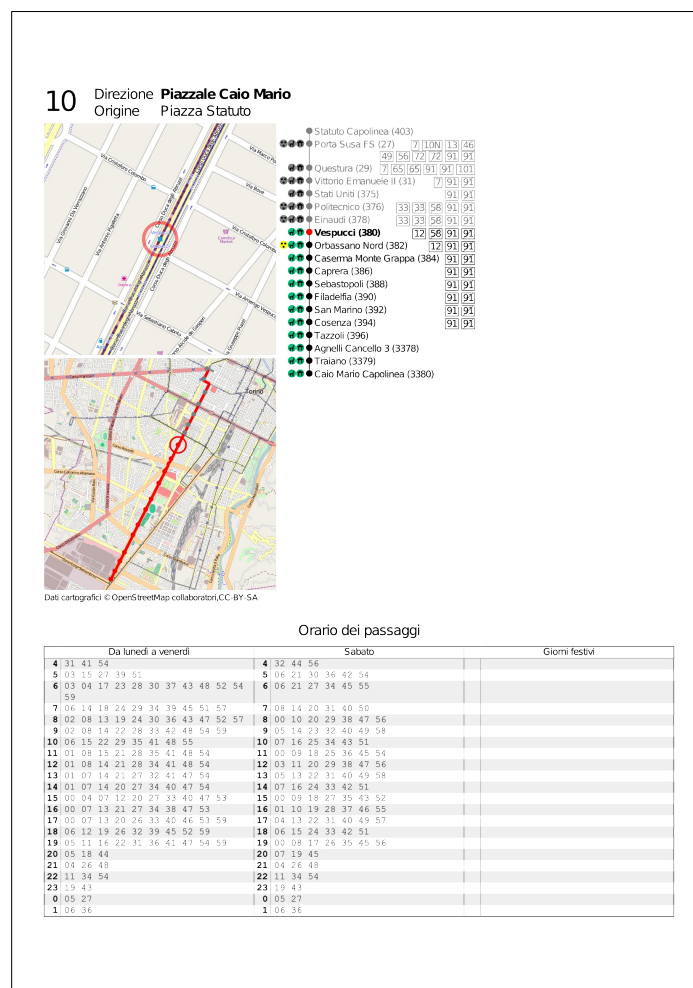
Operator and OSM data

- Transport operator
 - Schedules
 - Connections
 - Spelling and naming inconsistencies
 - Operator, route reference, stop reference
- OSM
 - Ways along route
 - Stop locations and attributes
 - Operator, route reference, stop reference

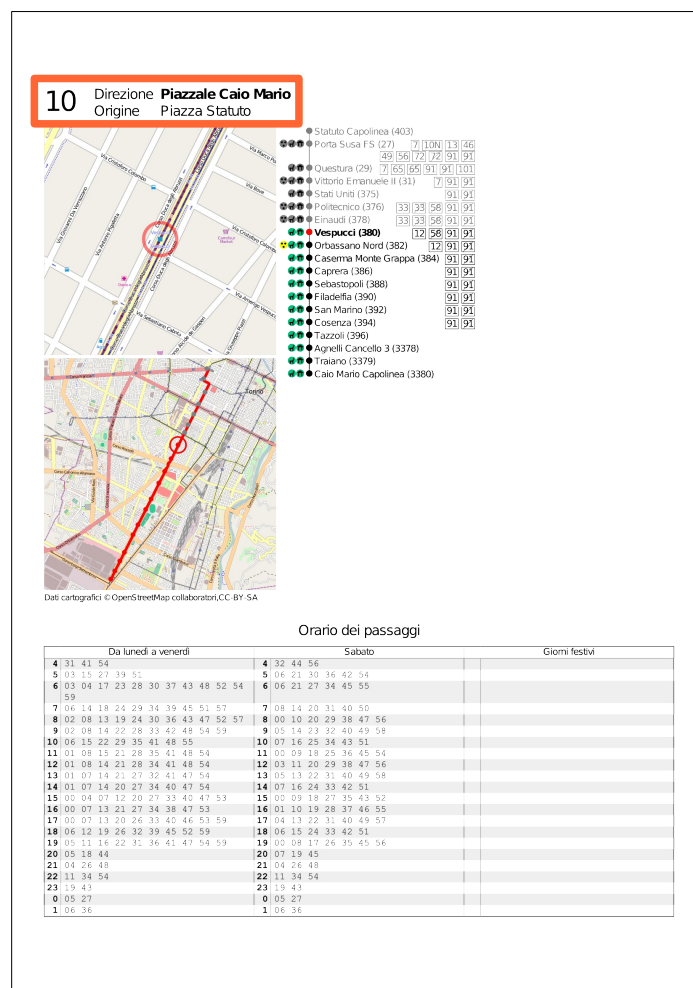
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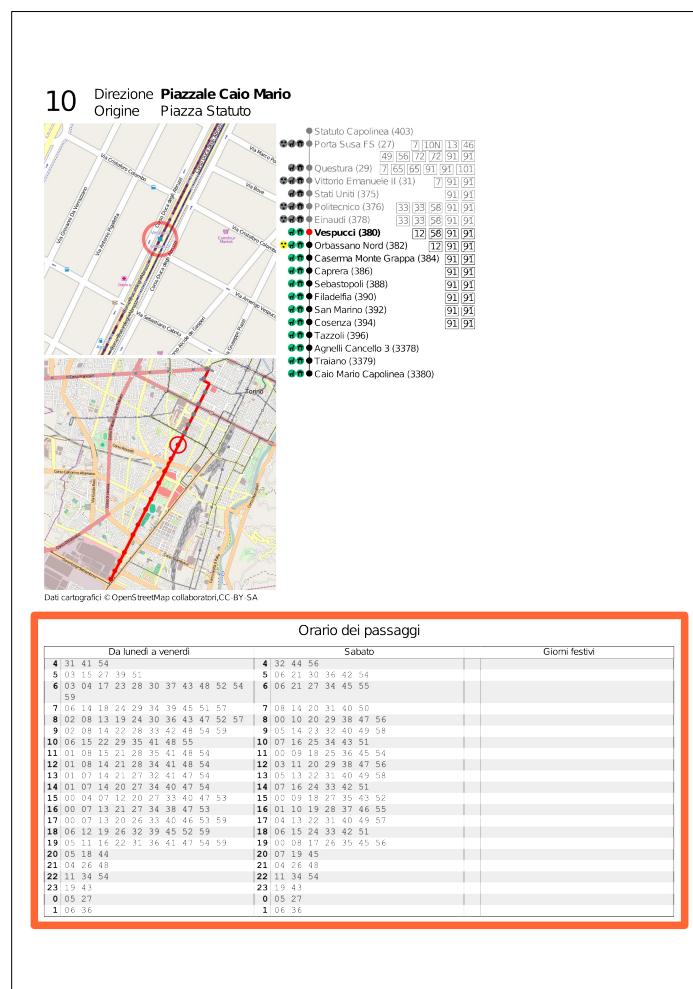
Printed stop placards



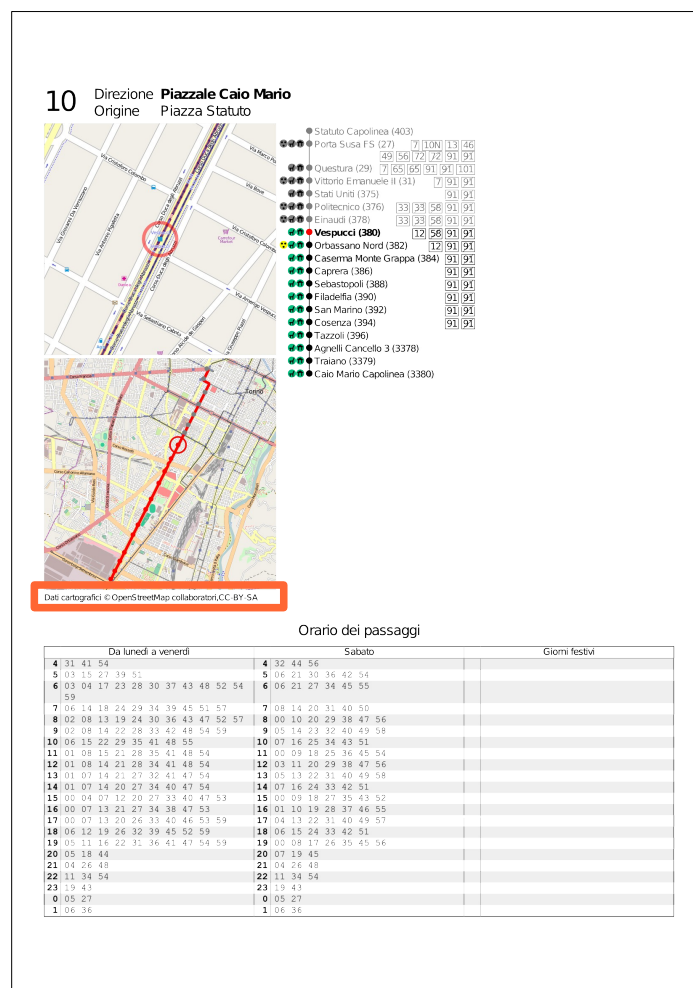
Printed stop placards



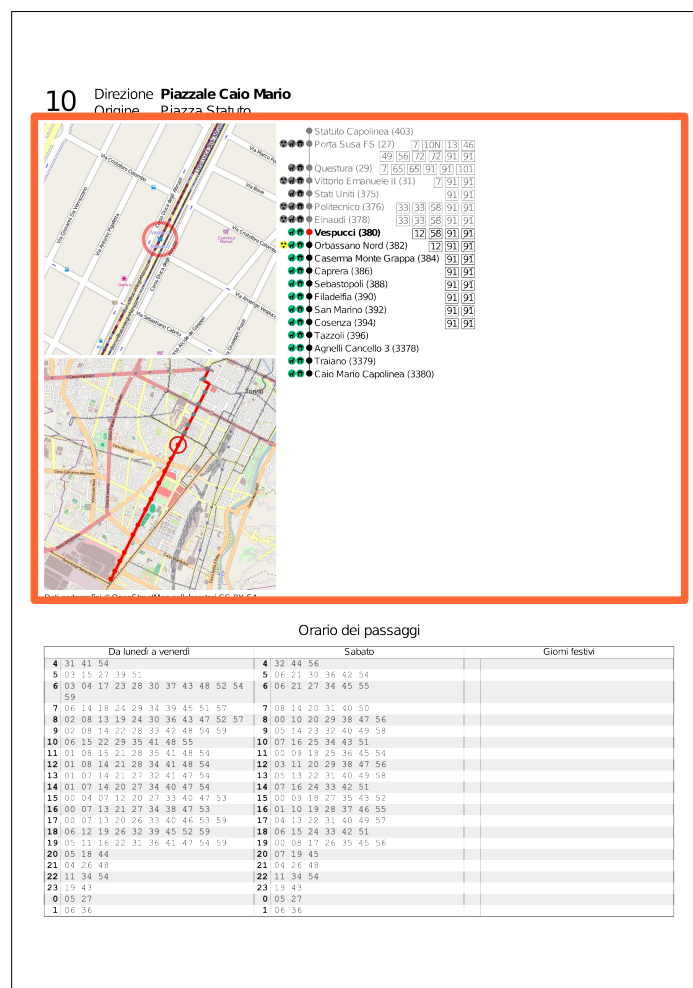
Printed stop placards



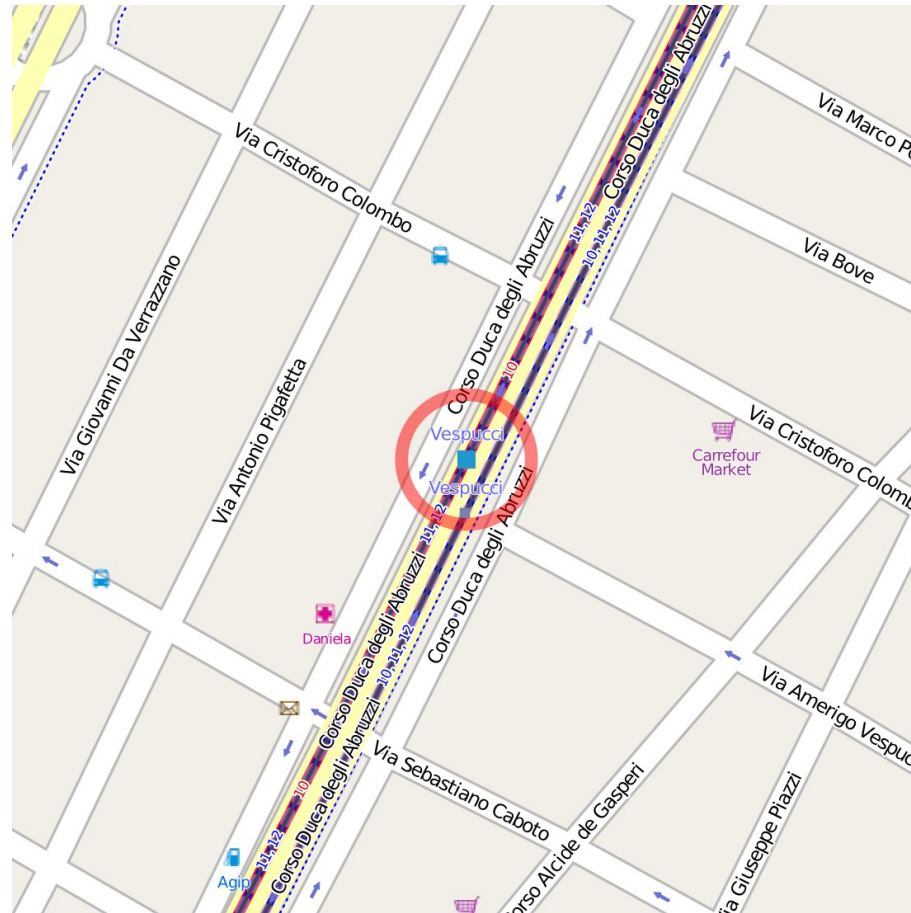
Printed stop placards



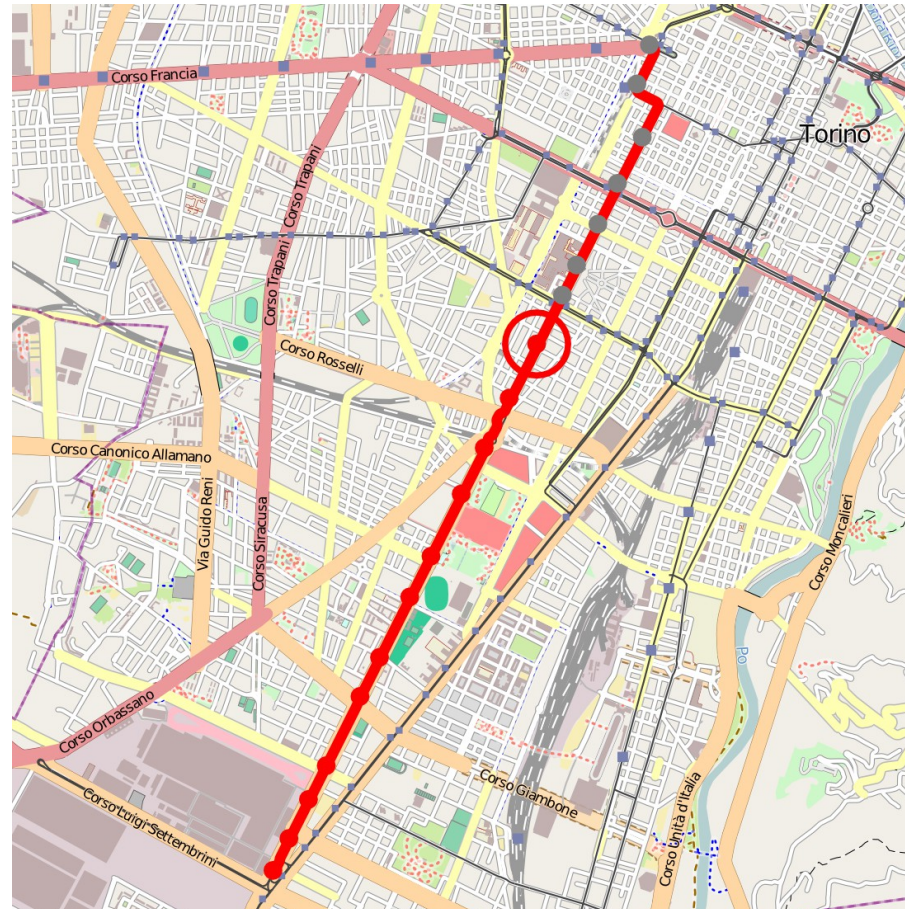
Printed stop placards



Close-up map

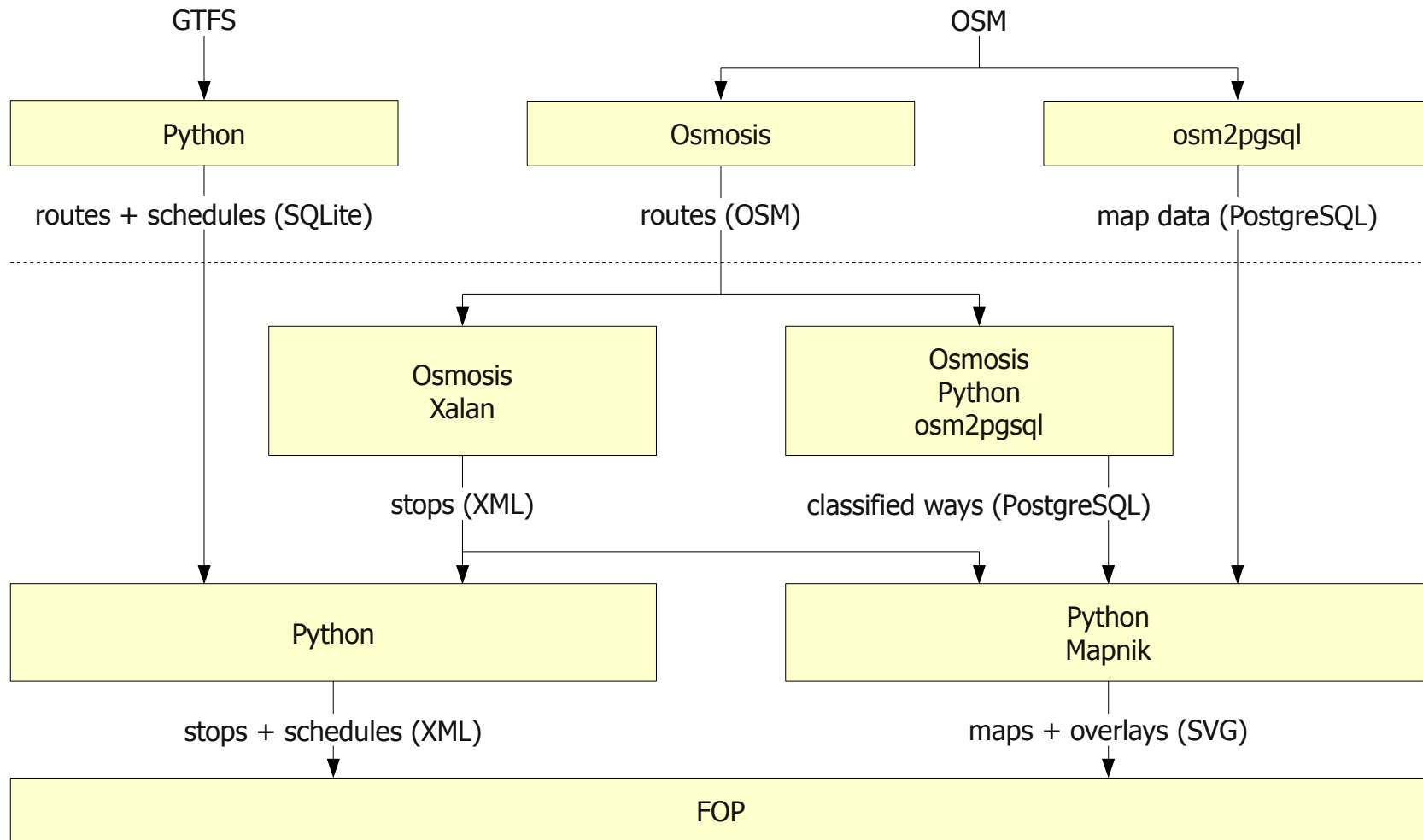


Overview map

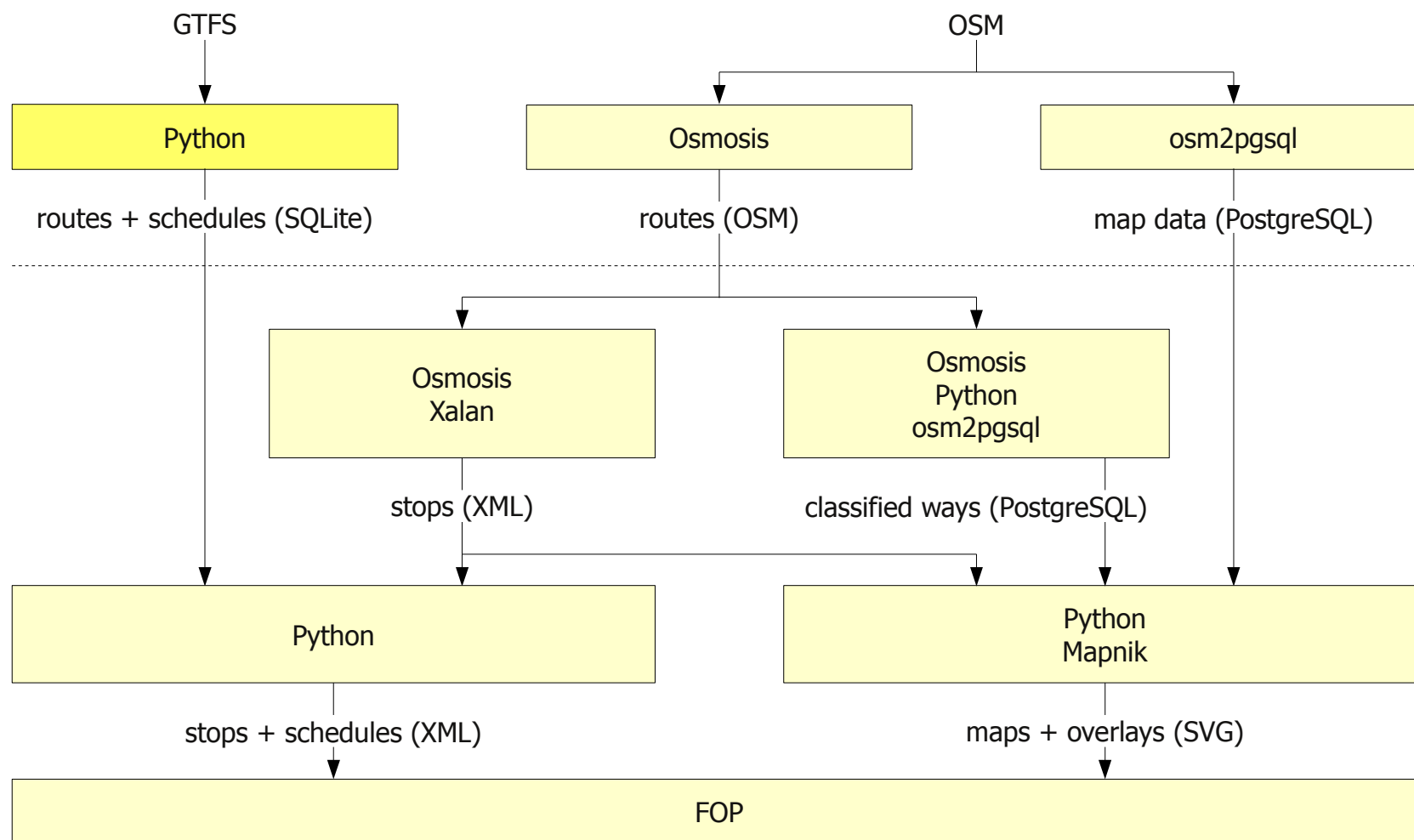


Stazione	1	2	3	4	5	6
Statuto Capolinea (403)						
Porta Susa FS (27)				7	10N	13 46
				49	56	72 72 91 91
Questura (29)				7	65	65 91 91 101
Vittorio Emanuele II (31)					7	91 91
Stati Uniti (375)						91 91
Politecnico (376)					33	33 58 91 91
Einaudi (378)					33	33 58 91 91
Vespucci (380)					12	58 91 91
Orbassano Nord (382)					12	91 91
Caserma Monte Grappa (384)						91 91
Caprera (386)						91 91
Sebastopoli (388)						91 91
Filadelfia (390)						91 91
San Marino (392)						91 91
Cosenza (394)						91 91
Tazzoli (396)						
Agnelli Cancelli 3 (3378)						
Traiano (3379)						
Caio Mario Capolinea (3380)						

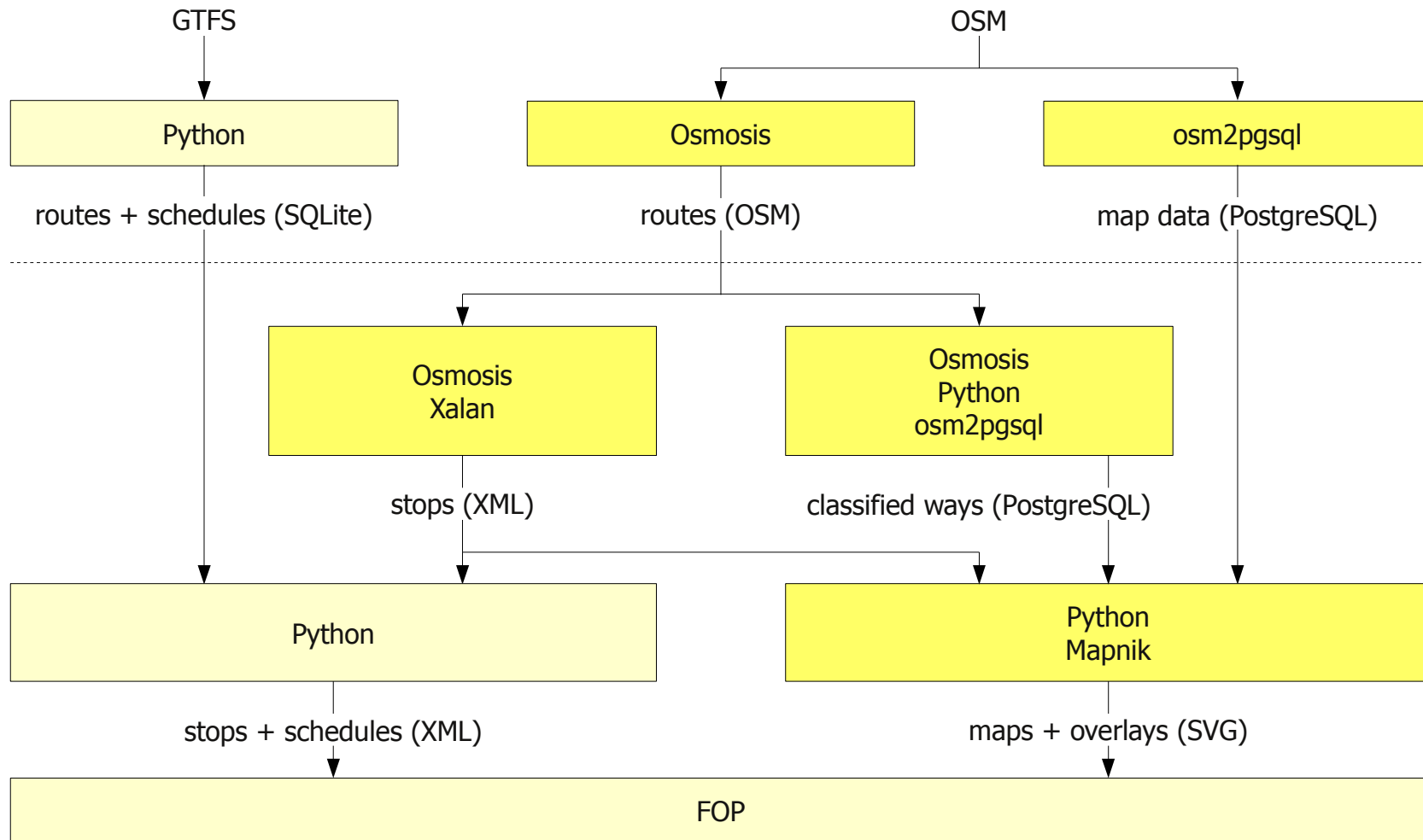
Toolchain



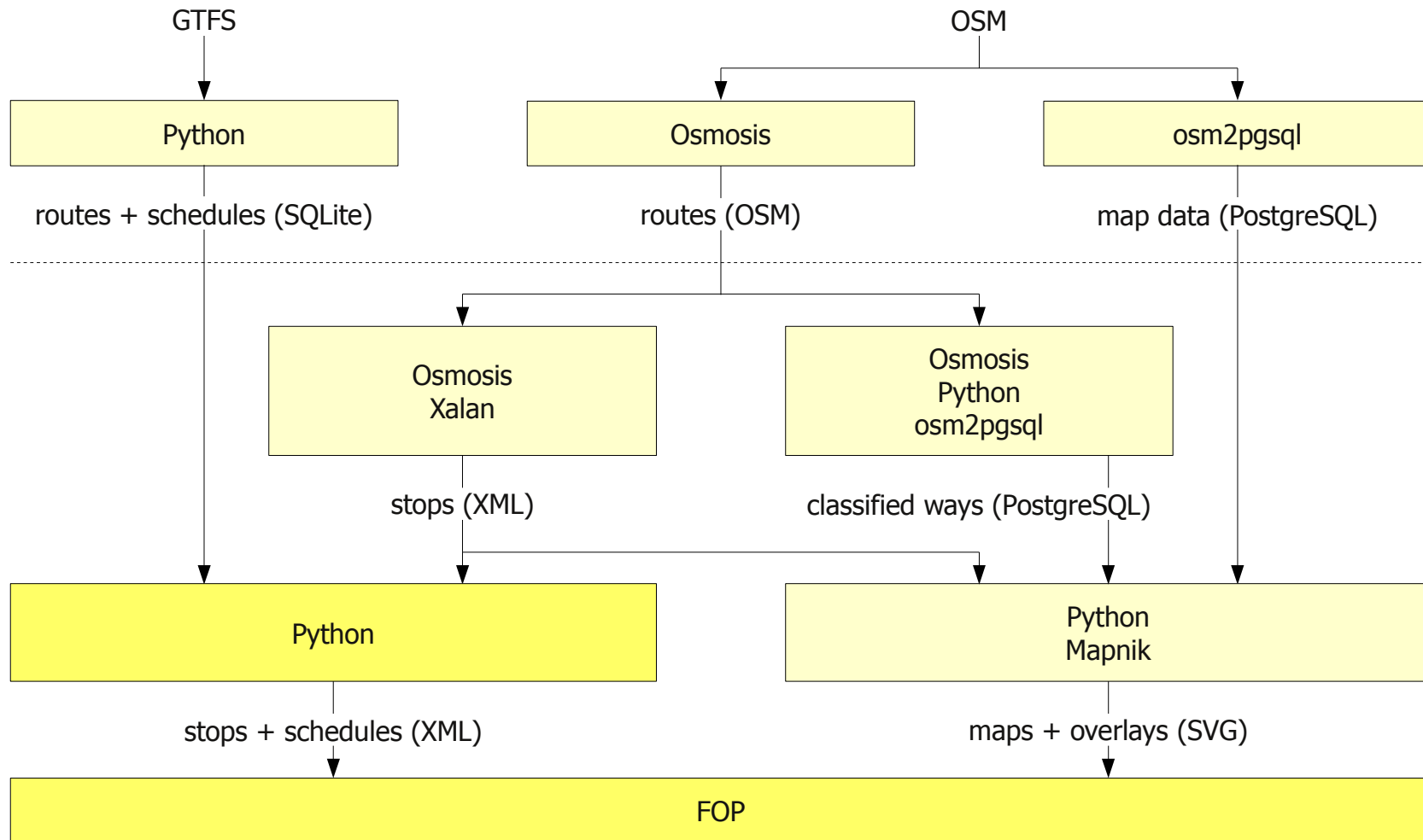
Operator data



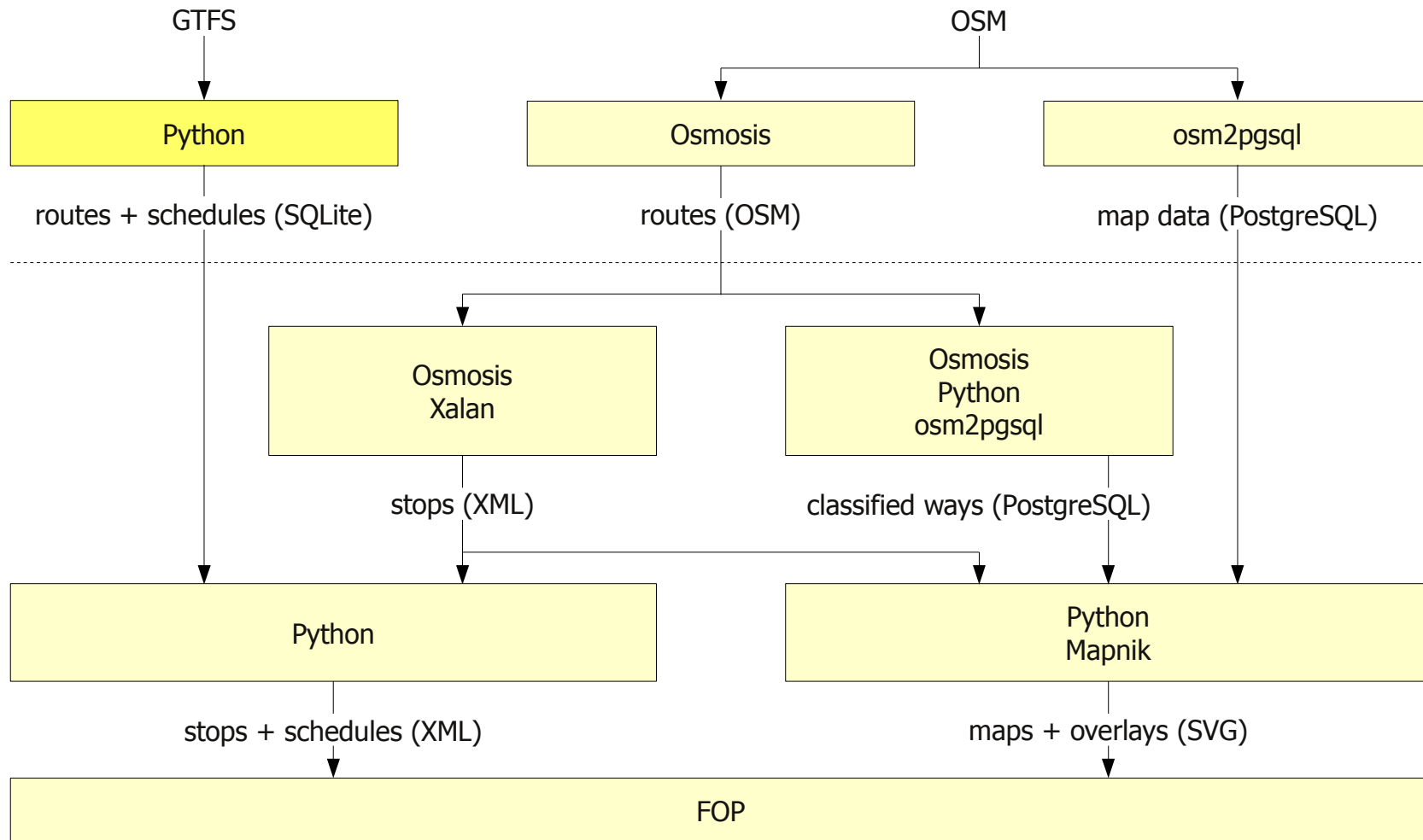
OSM data



Operator and OSM data



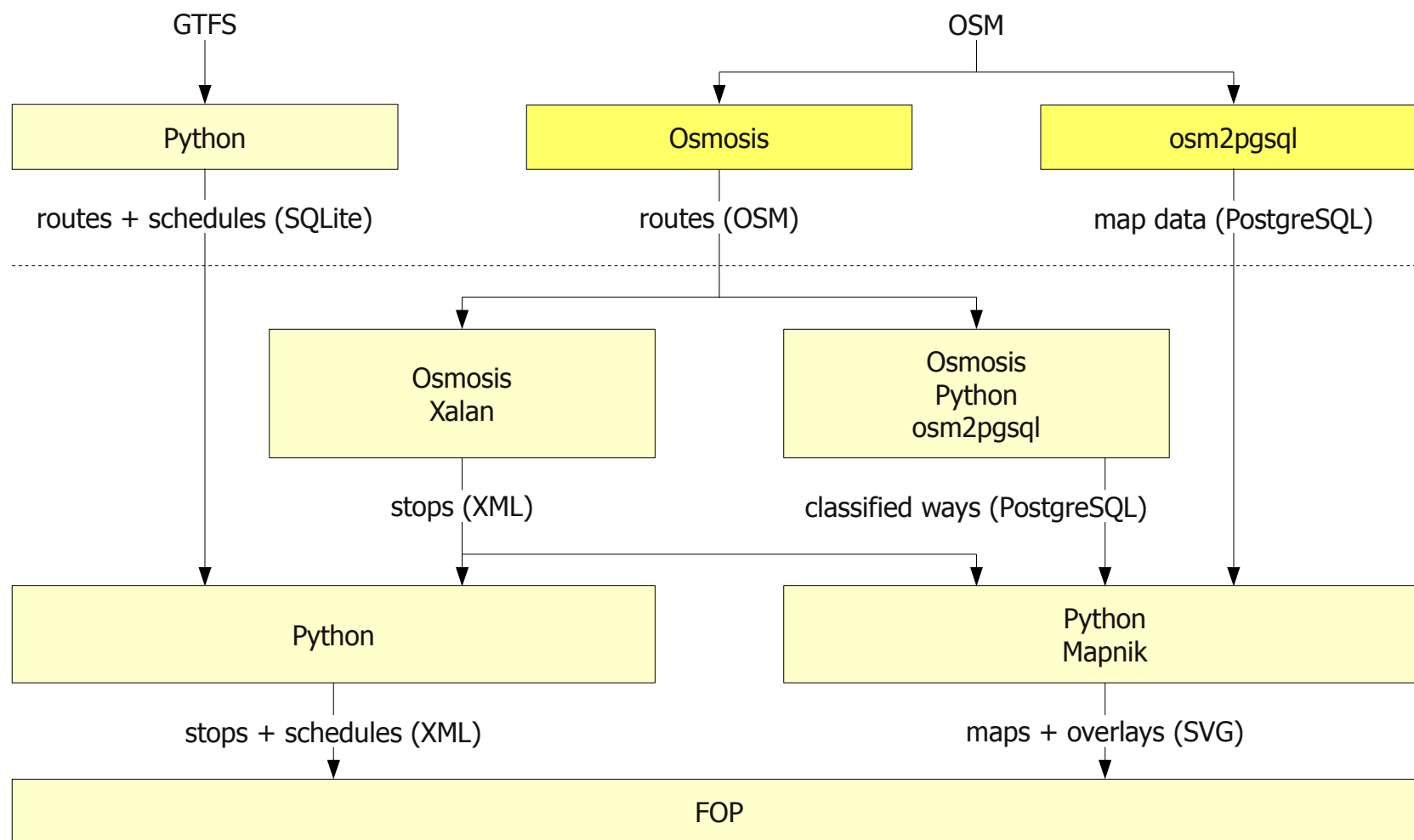
GTFS preprocessing



GTFS preprocessing

- GTFS
 - Collection of CSV files
 - Route and stop information
- Information collection
 - Stops for each route
 - Schedules for each stop
 - Connecting routes for each stop

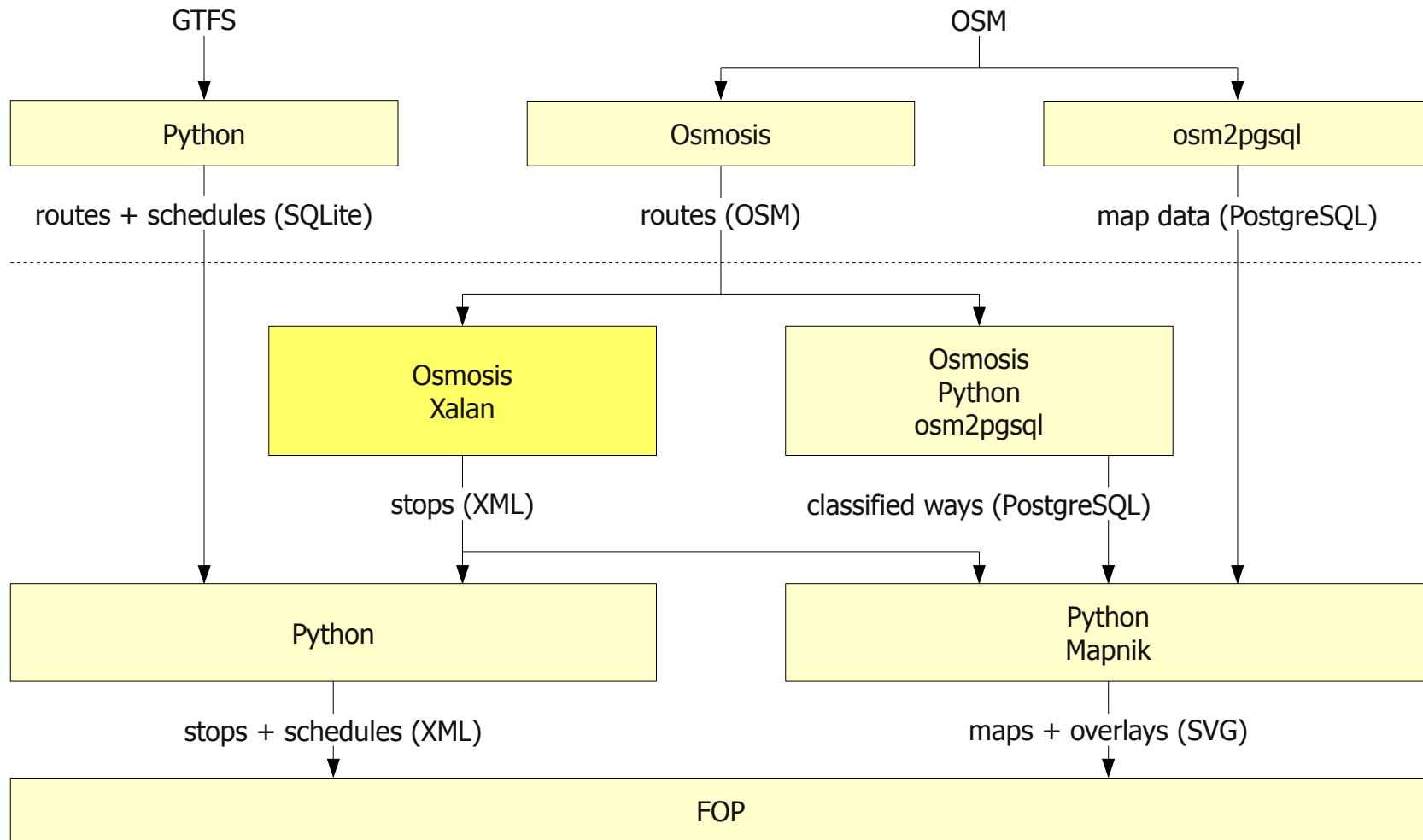
OSM preprocessing



OSM preprocessing

- Information collection
 - Route relations
 - Stop nodes
 - Using OSM public transport tags
 - Using OSM operator tag
- Import into database
 - Standard map data
 - Standard osm2pgsql
 - Standard database schema

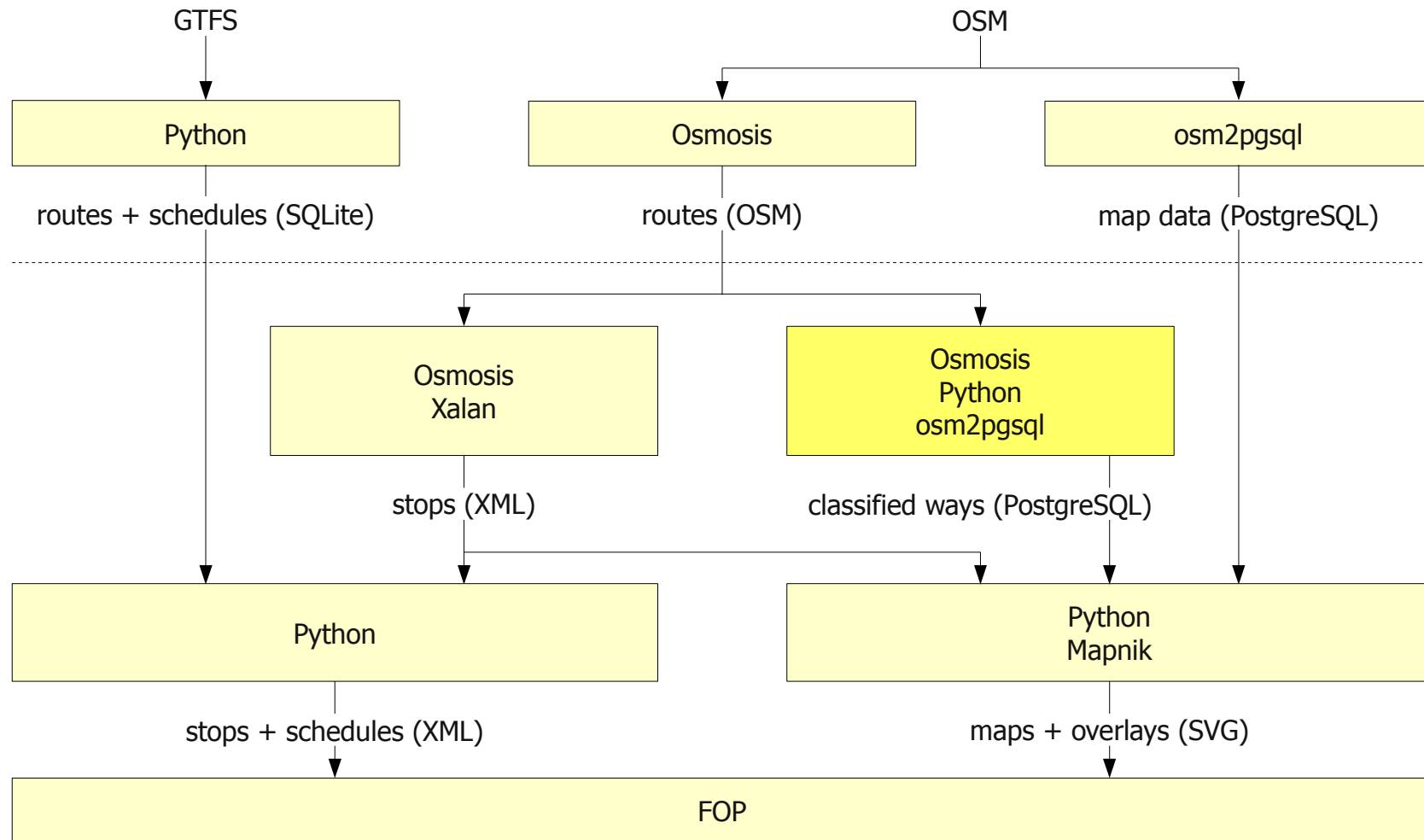
Stop list generation



Stop list generation

- Executed for specific route relation
- Information collection per stop
 - Location
 - Name
 - Reference
 - Attributes
 - Bench
 - Shelter
 - Tactile paving

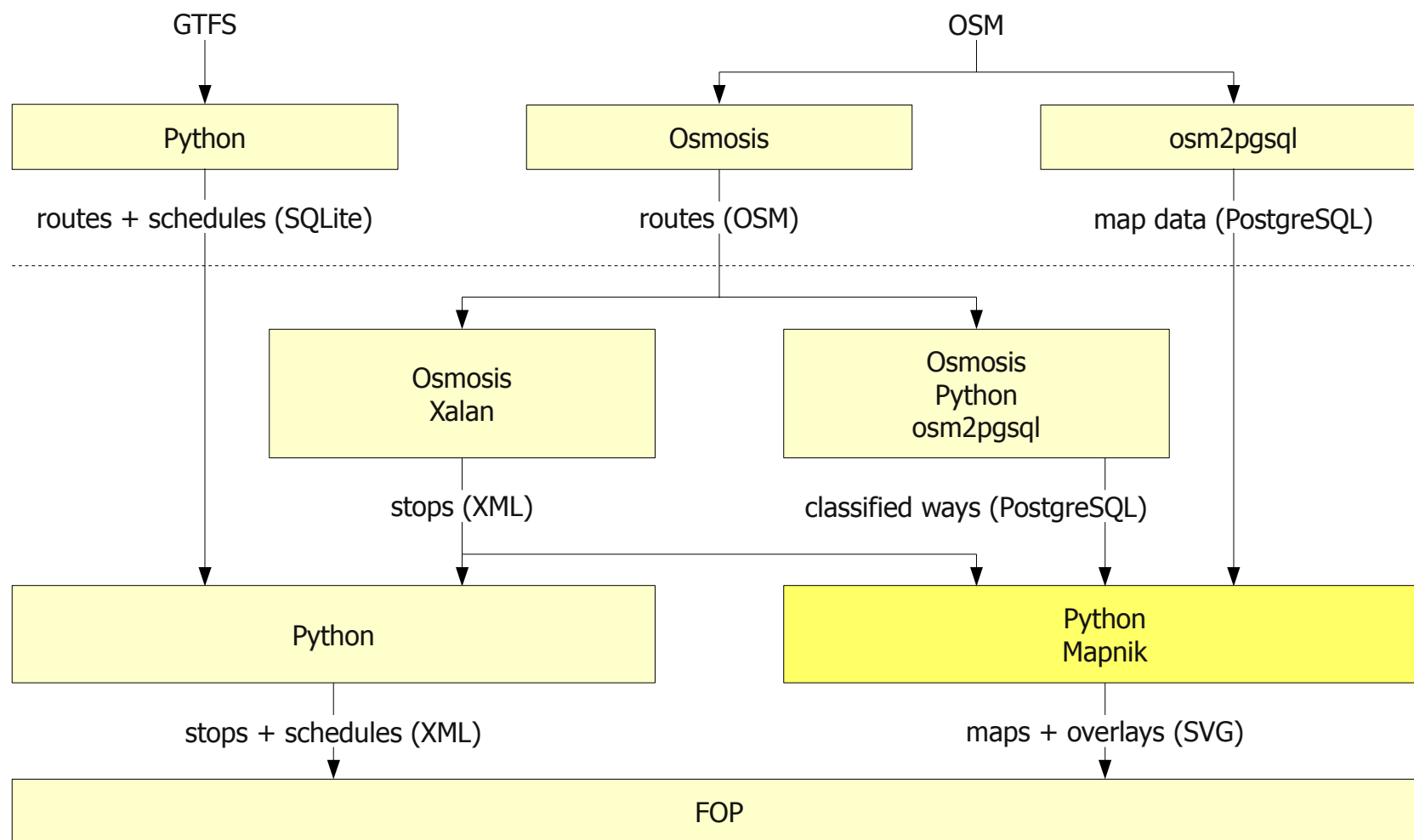
Way classification



Way classification

- Classification
 - Ways along current route relation
 - Ways along other route relations
- Import into database
 - Classified ways
 - Concatenated route references
 - Standard osm2pgsql
 - Standard database schema

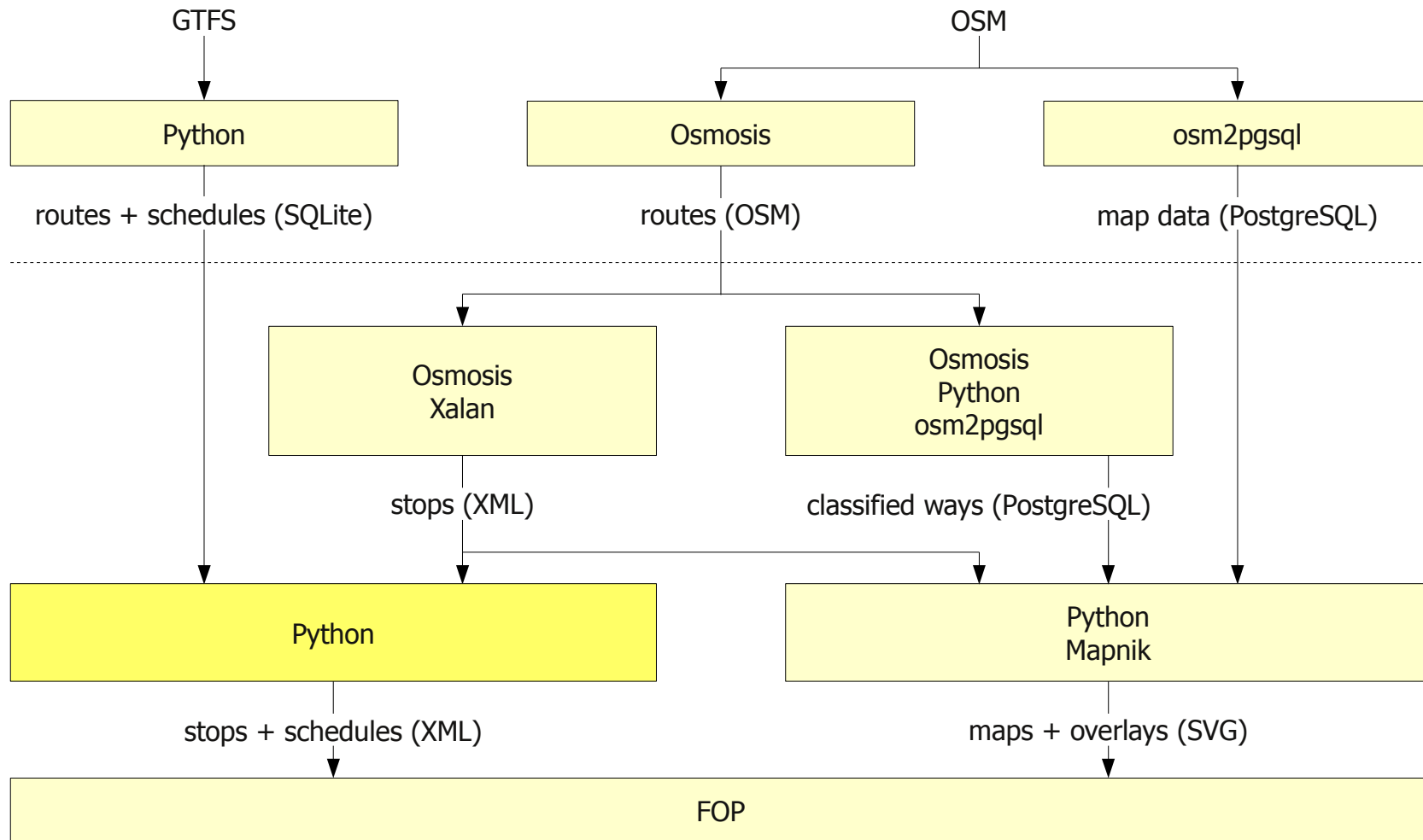
Map and overlay generation



Map and overlay generation

- Single SVG overview map
- SVG close-up map for each stop
 - Highlighting current route relation
 - Showing all other route relations
- SVG overview map overlay for each stop
 - Highlighting current stop
 - Showing all other stops

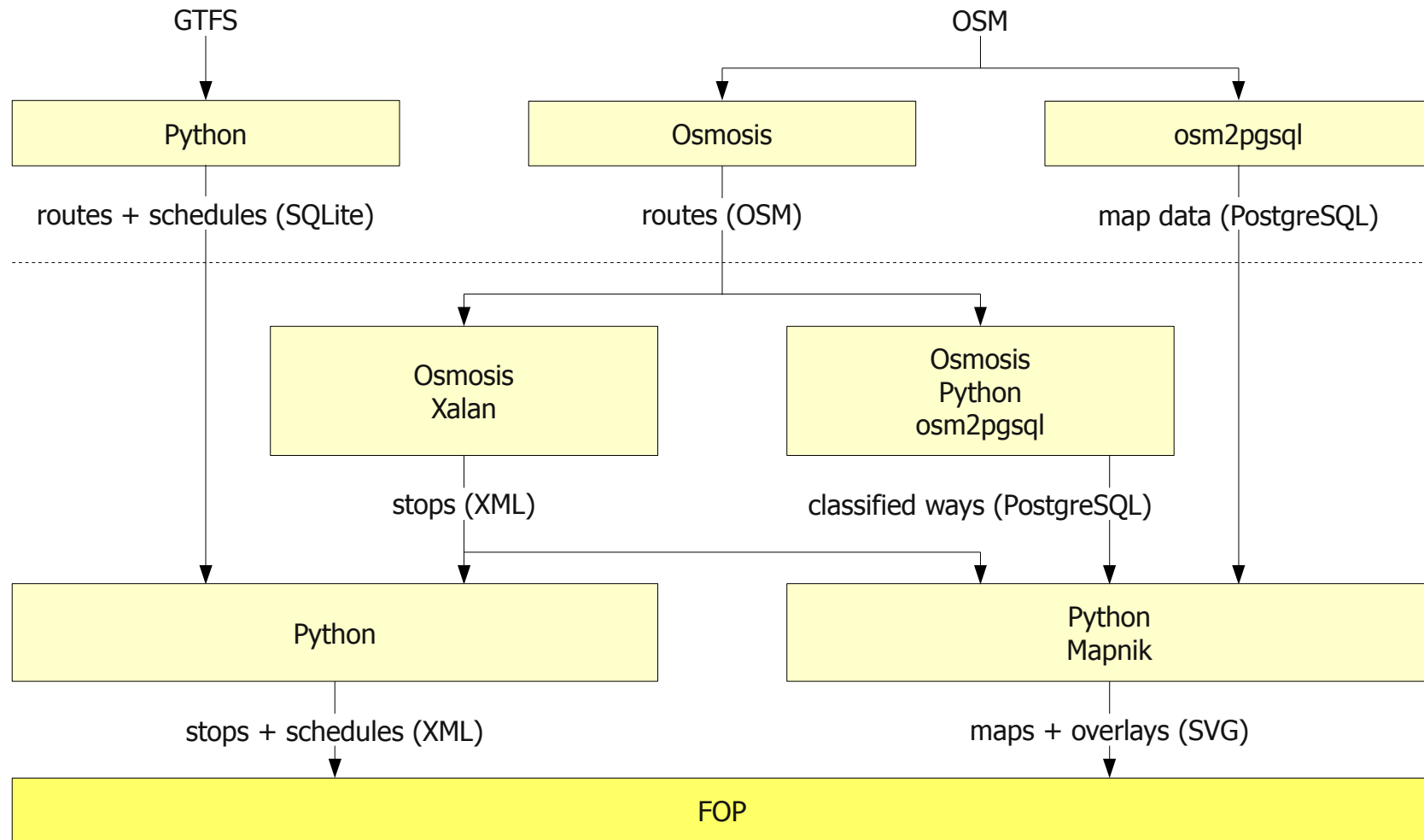
Schedule addition



Schedule addition

- Combination of operator and OSM data
 - Schedules from operator
 - Connections from operator
 - Stop names from OSM
 - Stop attributes from OSM
- Matching by route reference, stop reference

Strip map and placard generation



Strip map and placard generation

- One A4 page for each stop
- Generated using Apache FOP
- Strip map
 - Previous, current, subsequent stops
 - Stop names, references, attributes
 - Connections
- Overview map with overlay
- Close-up map
- Schedule

Results

- Printed stop placards
 - Combined benefits of operator and OSM data
 - Automatic generation
 - Flexible presentation
- Challenges
 - OSM consistency
 - OSM completeness
 - Apache FOP

Beyond public transport

- Custom printed documents
 - Driven by changes to external data
 - Incorporating changes to OSM data
- Benefits to external data provider
 - Maps
 - Flexible toolchain
- Benefits to OSM
 - Improved consistency and completeness
 - Project visibility

Custom printed OSM maps: Public transport and beyond

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