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MarketShare Big Data Analytics

An Big Data Analytics architecture for the cloud

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MarketShare: Modeling on Big Data

- Cloud architecture evolution
- Equations Compiler
- Distributed modeling on the cloud

* Source: Interbrand 2011 report

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Cloud + Big Data

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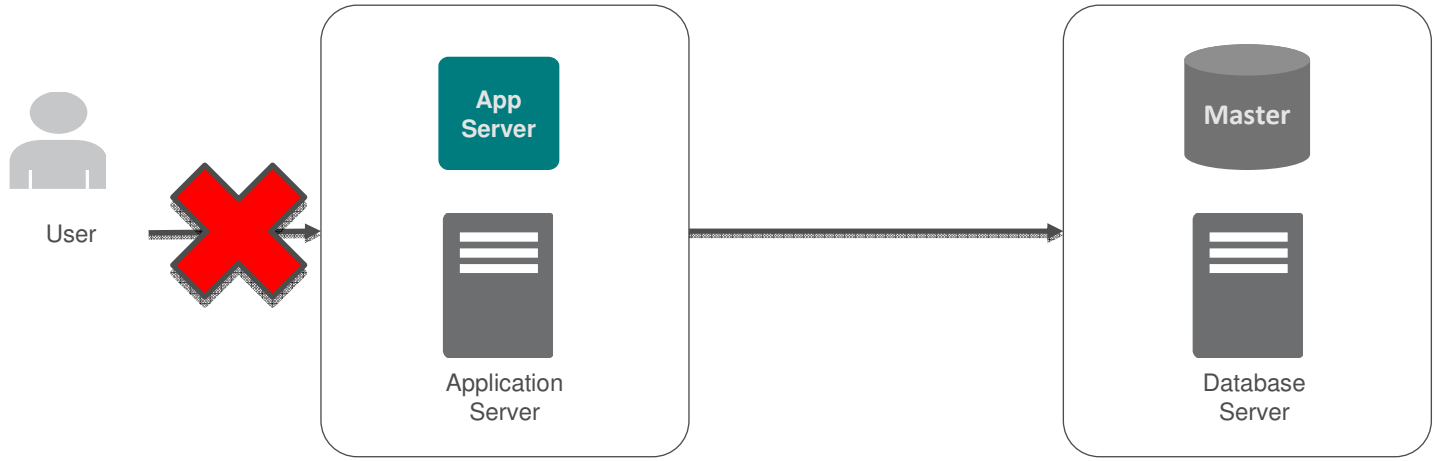
Traditional 3 tier architecture



Eliminate accessibility restrictions

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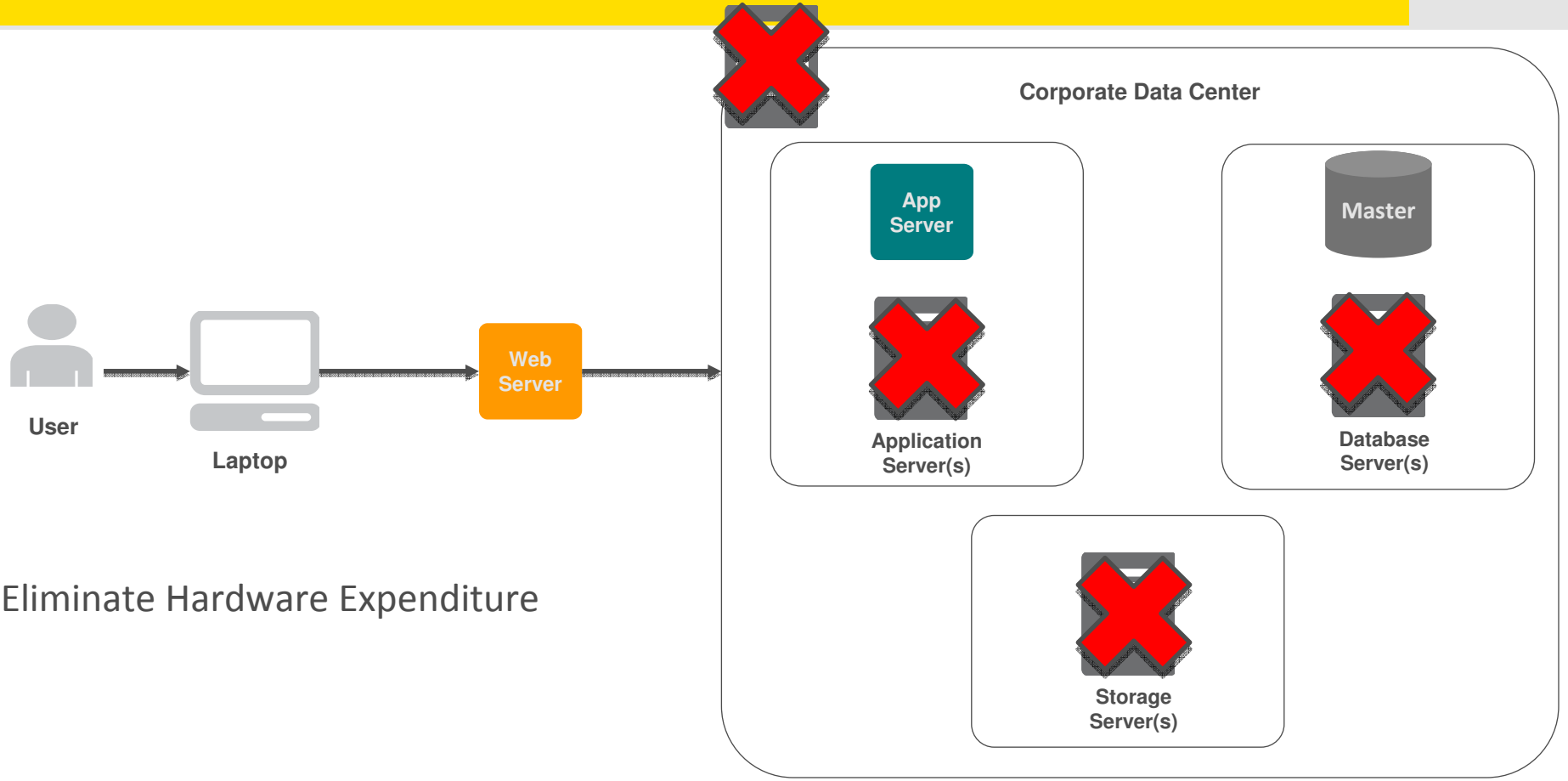
Moving to web based applications



Eliminate Hardware Expenditure

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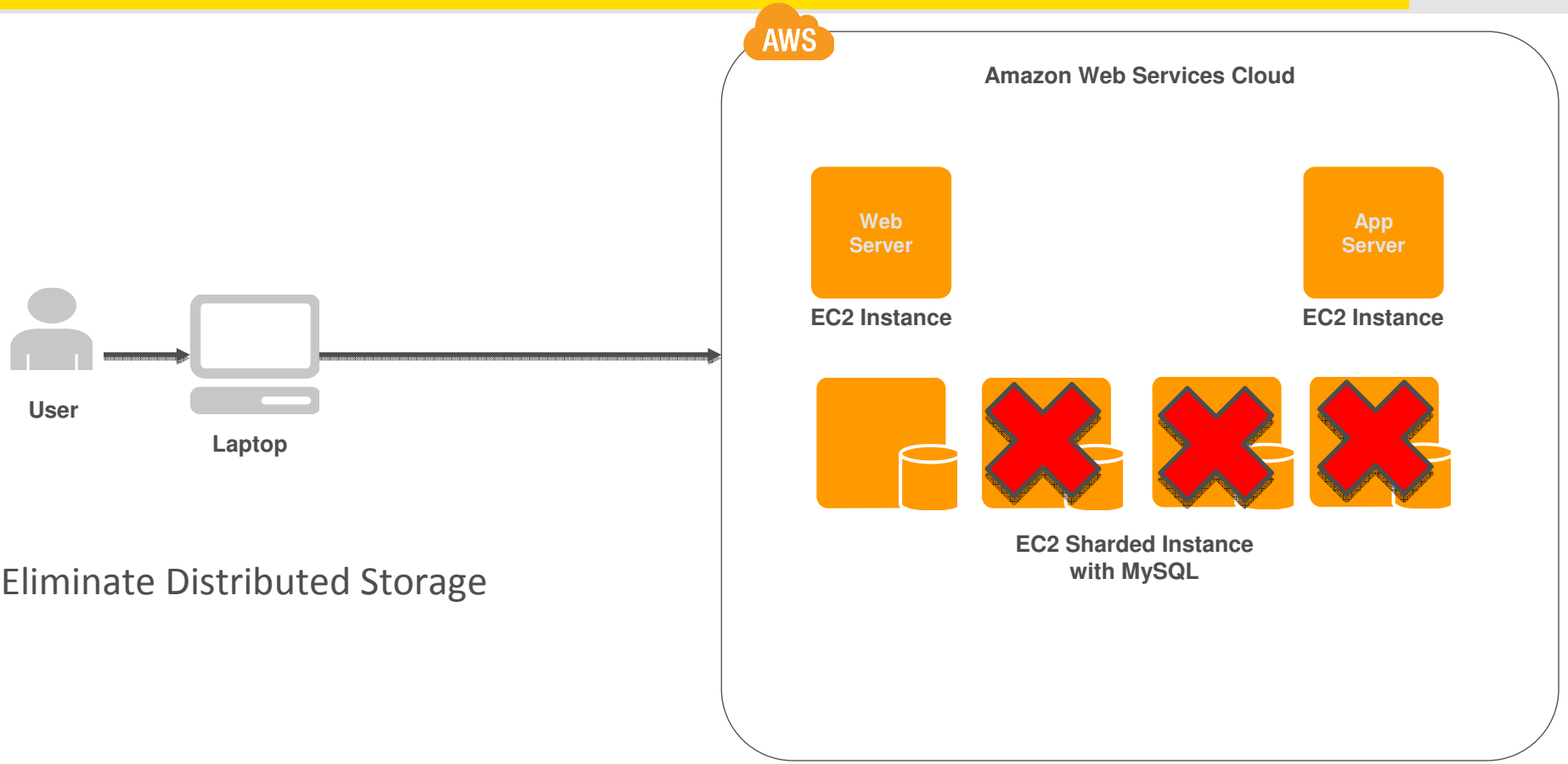
Moving to the cloud



Eliminate Distributed Storage

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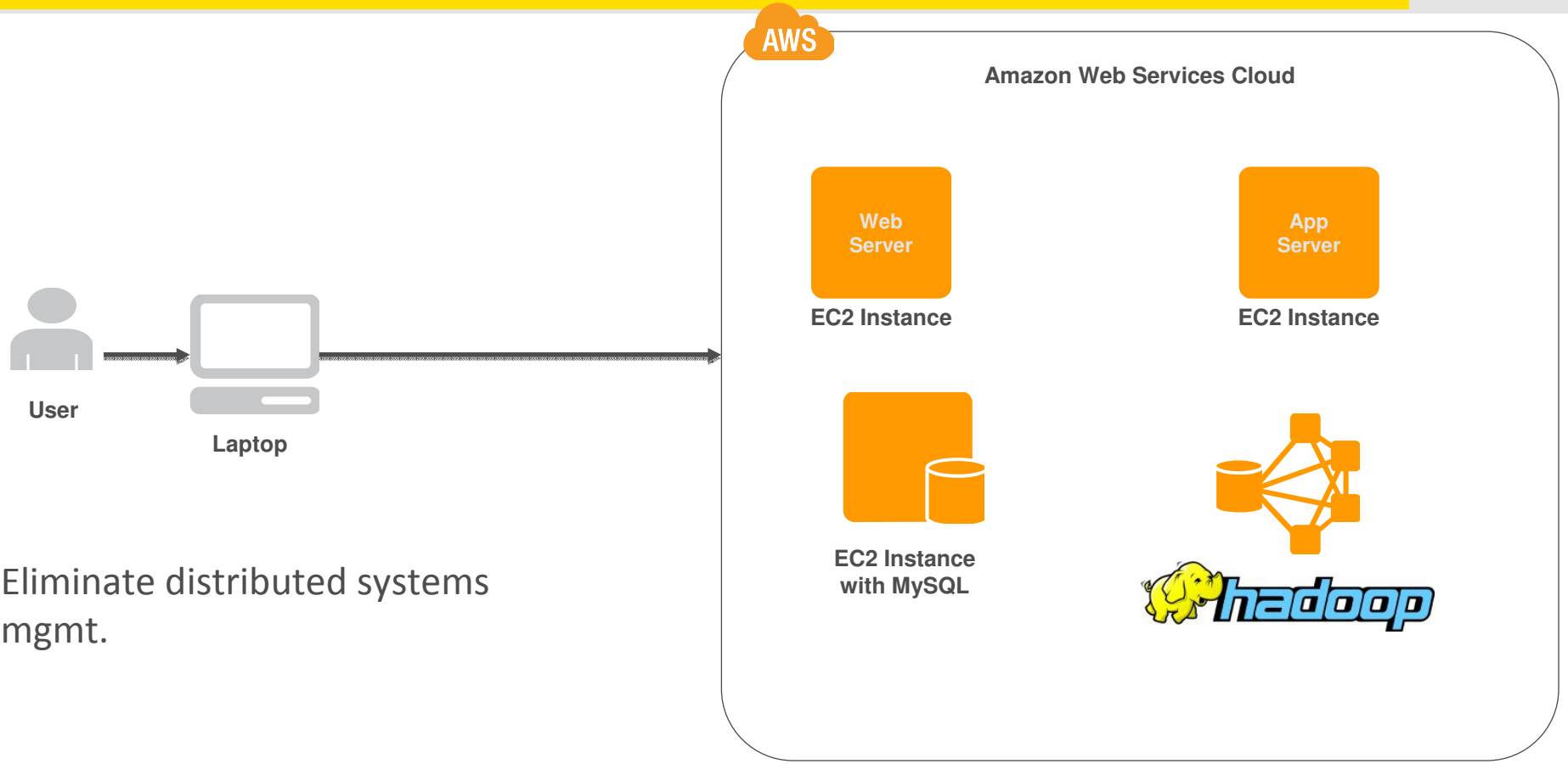
Moving big data to Hadoop



Eliminate distributed systems mgmt.

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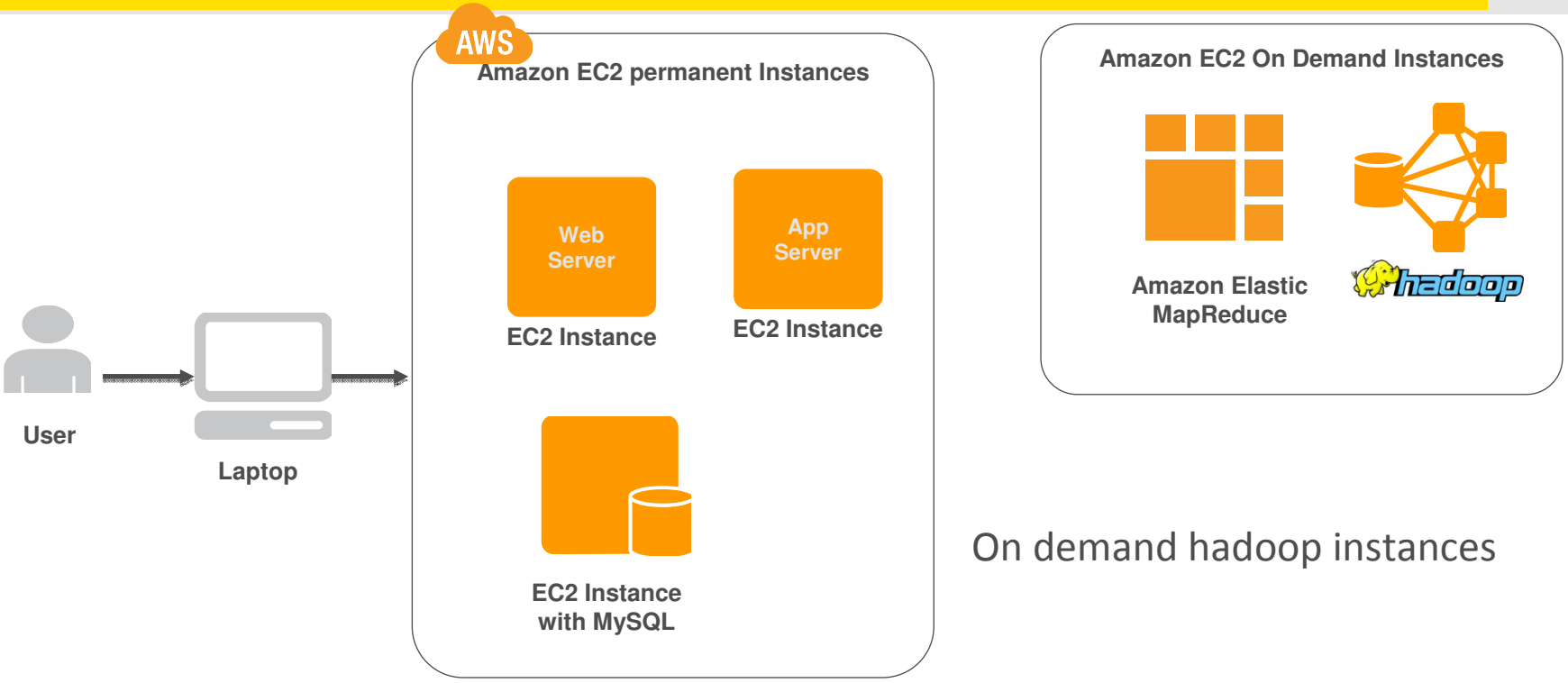
Compute Elasticity



On demand hadoop instances

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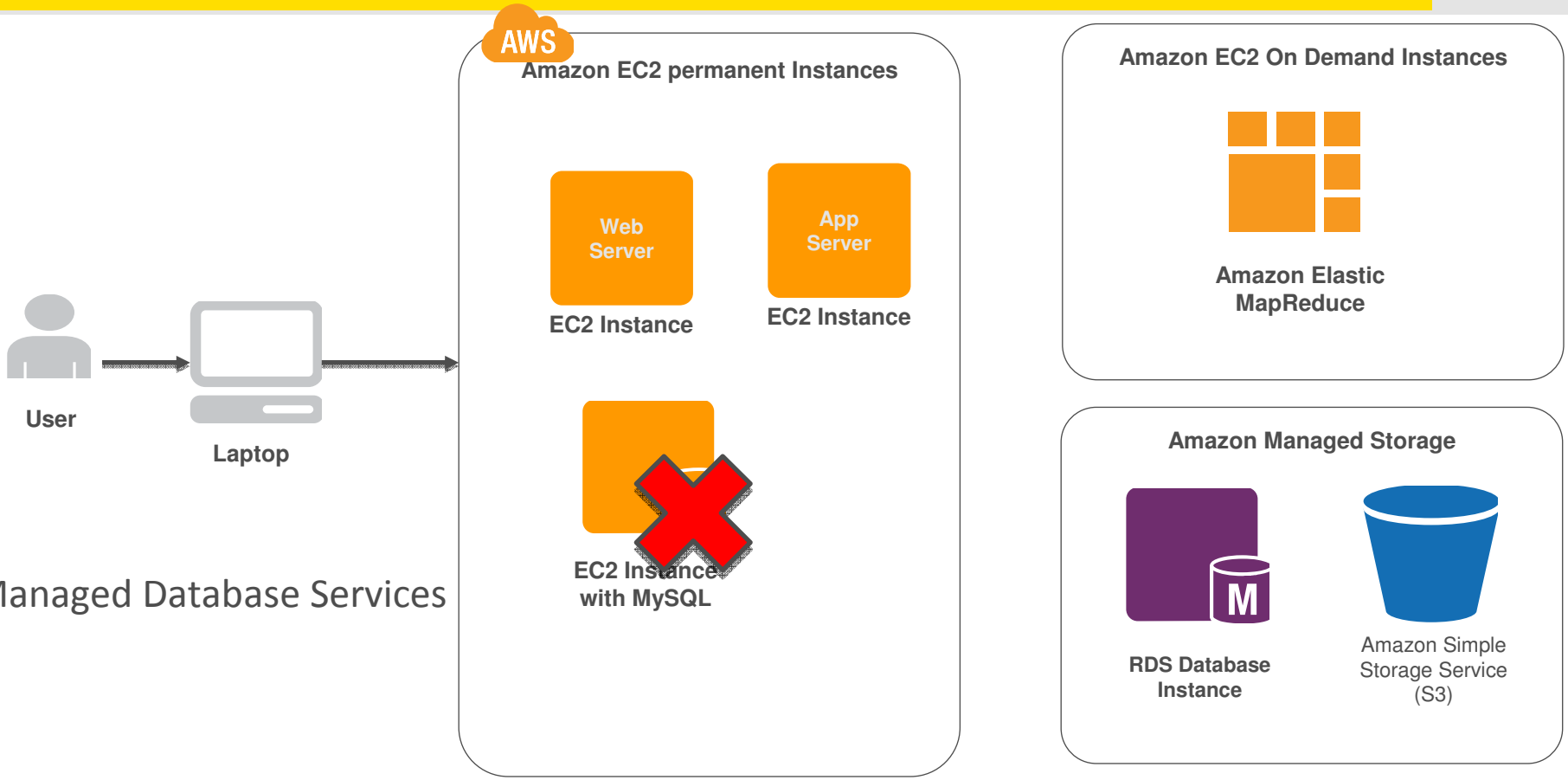
Storage Elasticity



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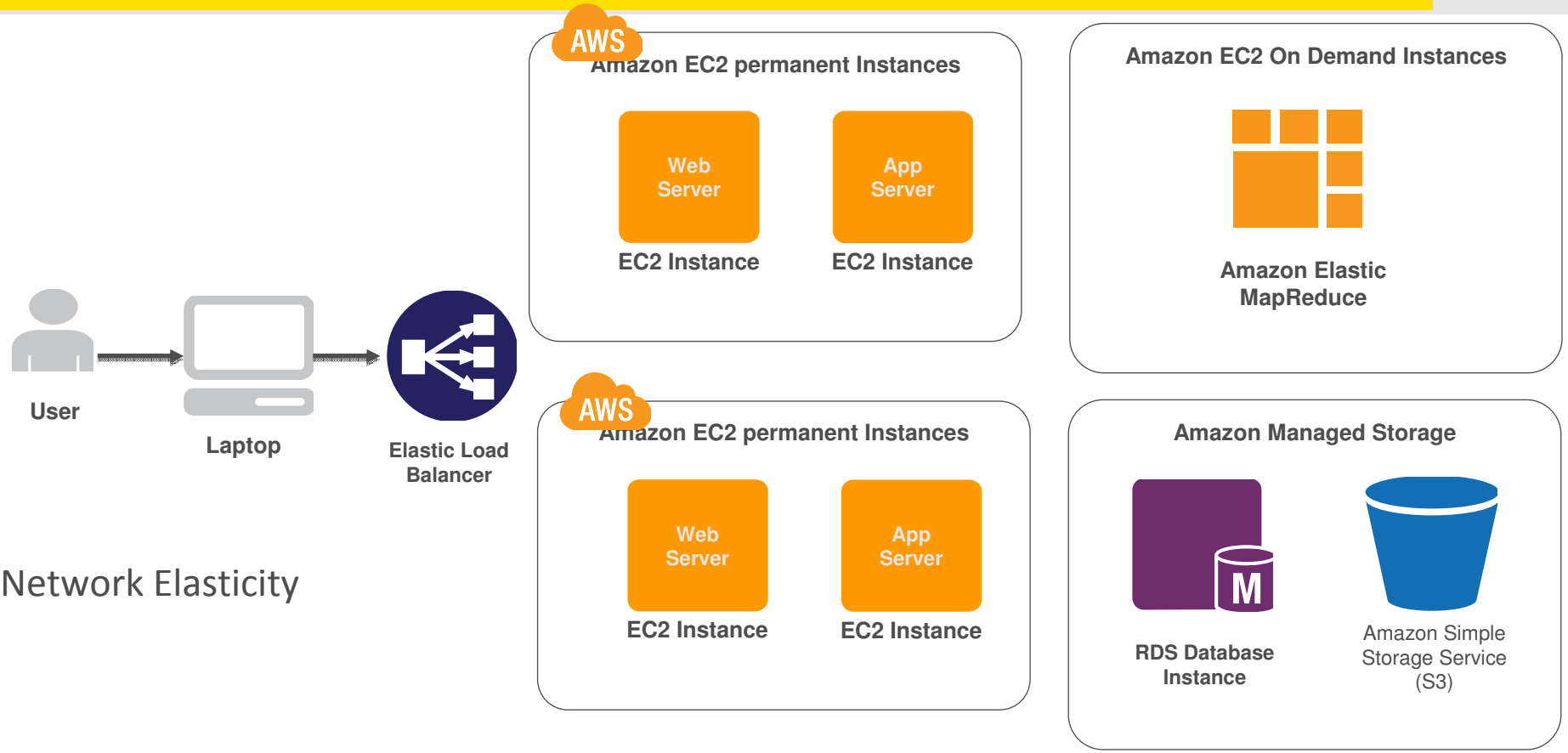
Network Elasticity



Network Elasticity

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Defining the Cloud

Cloud = Managed Storage + Network Elasticity + On Demand Compute

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Cloud + Big Data + Modeling

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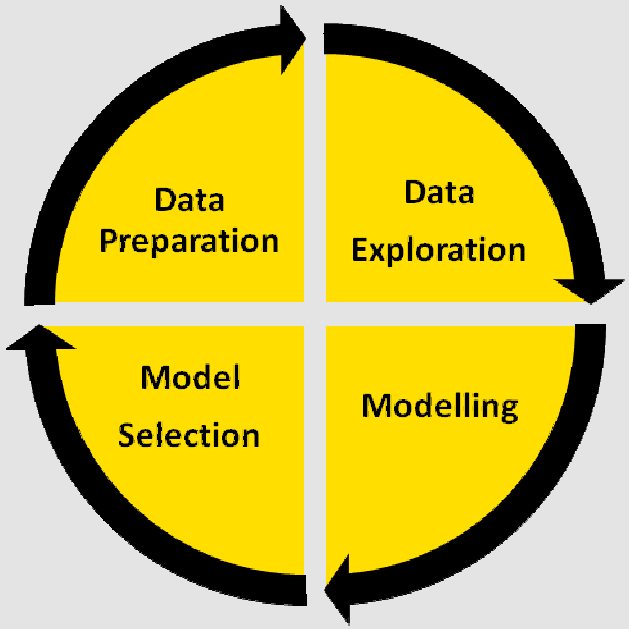
The Technology Puzzle



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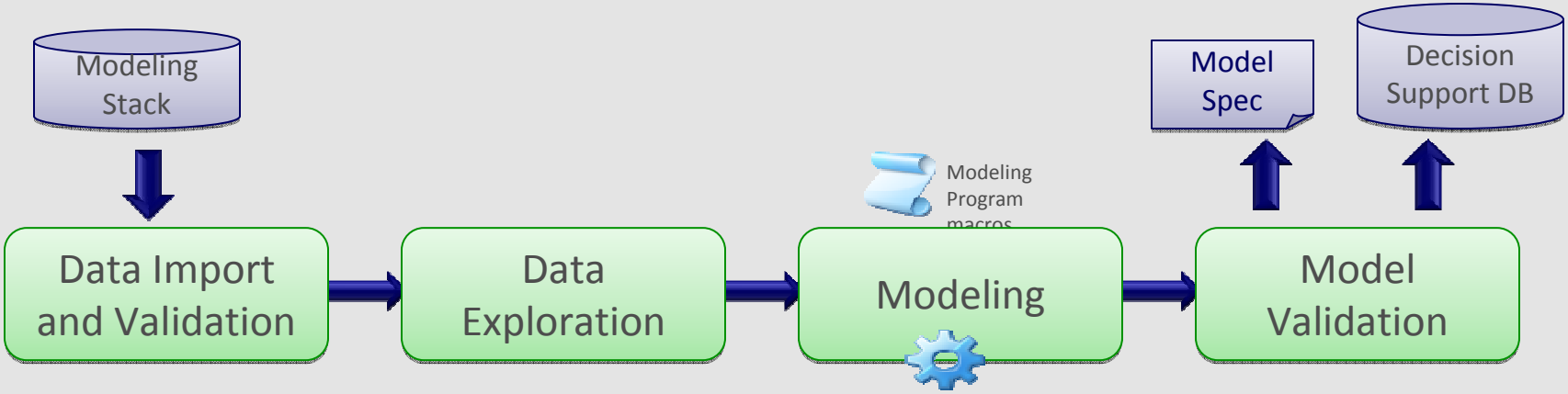
Modeling Process



Import to Modeling Program DB	Enhance Database	Modeling Demands	Confirm Models
• Time series of sales • Event, team variables • GQV, economic variables	• Variable generation E.g. game winner streak, % tickets sold • Exploration to understand and improve	• Regression based time series modeling • Initial starting variables • Statistical selection of best variables and weights • Iterative process	• Development and Holdout samples • Confirm model will work for future events

Modeling Objective: Find the best function:

Ticket Demand = F(time. event. team. GQV. economics. etc.)

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Equations Compiler

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An Equation

Dependent Variable: LOG(FULL_REV)
Method: Panel EGLS (Cross-section weights)
Date: 12/02/10 Time: 23:20
Sample: 1/15/2005 4/24/2010 IF PRODUCT="ACR"
Periods included: 276
Cross-sections included: 2
Total panel (balanced) observations: 552
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.928059	0.581194	3.317407	0.0010
LOG(FULL_REV(-1))	0.435265	0.031105	13.99354	0.0000
D_JULY1407	-0.972718	0.123655	-7.866387	0.0000
NVER_ACR89S	0.088231	0.018782	4.697745	0.0000
NVER_ACR89W(5)	-0.539195	0.089515	-6.023482	0.0000
NVER_ACR89W(4)	-0.361140	0.090928	-3.971722	0.0001
NVER_ACR89W	0.374661	0.089790	4.172631	0.0000
NVER_ACR89W(-1)	-0.294214	0.092878	-3.167755	0.0016
M01	0.132766	0.031783	4.177300	0.0000
M02	-0.007974	0.029042	-0.274556	0.7838
M03	0.074205	0.029115	2.548652	0.0111
M04	-0.009924	0.029221	-0.339623	0.7343
M05	0.006072	0.030147	0.201425	0.8404
M06	-0.031082	0.033140	-0.937899	0.3487
M08	-0.027964	0.030574	-0.914643	0.3608
M09	-0.048330	0.029858	-1.618646	0.1061
M10	-0.019334	0.030224	-0.639684	0.5227
M11	0.128423	0.035376	3.630205	0.0003
M12	-0.043087	0.033052	-1.303608	0.1929
H_CHRISMAS	-0.417512	0.064325	-6.490661	0.0000
H_USTHANKS	-0.465110	0.073687	-6.311968	0.0000
H_MLKING	-0.136058	0.065313	-2.083173	0.0377
H_VET_REM	-0.152138	0.066112	-2.301234	0.0218
H_GOODFRI	-0.190309	0.091691	-2.075553	0.0384
LOG(O_STRONGFV+O_SLIGHTFV+1)	0.027277	0.009282	2.938598	0.0034
LOG(DISP_SPEND(-3)+1)	0.005074	0.002074	2.446742	0.0147
LOG(EMAIL_DIRE(-4)+1)	0.004605	0.003108	1.481605	0.1391
LOG(CLICK_GOOG(-1)+1)	0.008355	0.002984	2.799882	0.0053
LOG(TRIALS_QUN+1)	0.115813	0.020992	5.516966	0.0000
LOG(AVG_EXRATE)	1.120003	0.216736	5.167590	0.0000
LOG(CLOSESTOCK+1)	0.386930	0.063674	6.076777	0.0000

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.795063	0.606433	2.960034	0.0032
C(2)	0.411358	0.031245	13.16558	0.0000
C(3)	-0.998070	0.133955	-7.450769	0.0000
C(4)	0.086044	0.020100	4.280843	0.0000
C(5)	-0.606070	0.096889	-6.255279	0.0000
C(6)	-0.406790	0.098392	-4.134375	0.0000
C(7)	0.353382	0.097319	3.631175	0.0003
C(8)	-0.286982	0.100499	-2.855556	0.0045
C(9)	0.144991	0.034232	4.235475	0.0000
C(10)	-0.010716	0.031422	-0.341032	0.7332
C(11)	0.082793	0.031695	2.612185	0.0093
C(12)	-0.017799	0.031659	-0.562192	0.5742
C(13)	0.009877	0.032654	0.302482	0.7624
C(14)	-0.021096	0.035899	-0.587657	0.5570
C(15)	-0.037336	0.033121	-1.127258	0.2602
C(16)	-0.051434	0.032318	-1.591502	0.1121
C(17)	-0.018745	0.032728	-0.572732	0.5671
C(18)	0.130375	0.037506	3.476104	0.0006
C(19)	-0.057581	0.035689	-1.613407	0.1073
C(20)	-0.454027	0.069646	-6.519041	0.0000
C(21)	-0.461600	0.090634	-5.093014	0.0000
C(22)	-0.173996	0.075795	-2.295609	0.0221
C(23)	-0.152578	0.070989	-2.149320	0.0321
C(24)	-0.210900	0.086137	-2.448408	0.0147
C(25)	0.029704	0.010043	2.957655	0.0032
C(26)	0.004821	0.002251	2.141985	0.0327
C(27)	0.004250	0.003372	1.260550	0.2080
C(28)	0.007673	0.003230	2.375561	0.0179
C(29)	0.141108	0.022728	6.208503	0.0000
C(30)	1.043132	0.206418	5.053500	0.0000
C(31)	0.394039	0.073700	5.346492	0.0000
C(32)	-0.494569	0.738763	-0.669456	0.5035

Determinant residual covariance	0.032323

Equation: LOG(FULL_REV) = C(1)*(PROD_COUNTRY="ACR_US") + C(2)
*LOG(FULL_REV(-1)) + C(3)*D_JULY1407 + C(4)*NVER_ACR89S +
C(5)*NVER_ACR89W(5) + C(6)*NVER_ACR89W(4) + C(7)
*NVER_ACR89W + C(8)*NVER_ACR89W(-1) + C(9)*M01 + C(10)*M02
+ C(11)*M03 + C(12)*M04 + C(13)*M05 + C(14)*M06 + C(15)*M08 +
C(16)*M09 + C(17)*M10 + C(18)*M11 + C(19)*M12 + C(20)
*H_CHRISMAS + C(21)*H_USTHANKS + C(22)*H_MLKING + C(23)
*H_VET_REM + C(24)*H_GOODFRI + C(25)*LOG(O_STRONGFV

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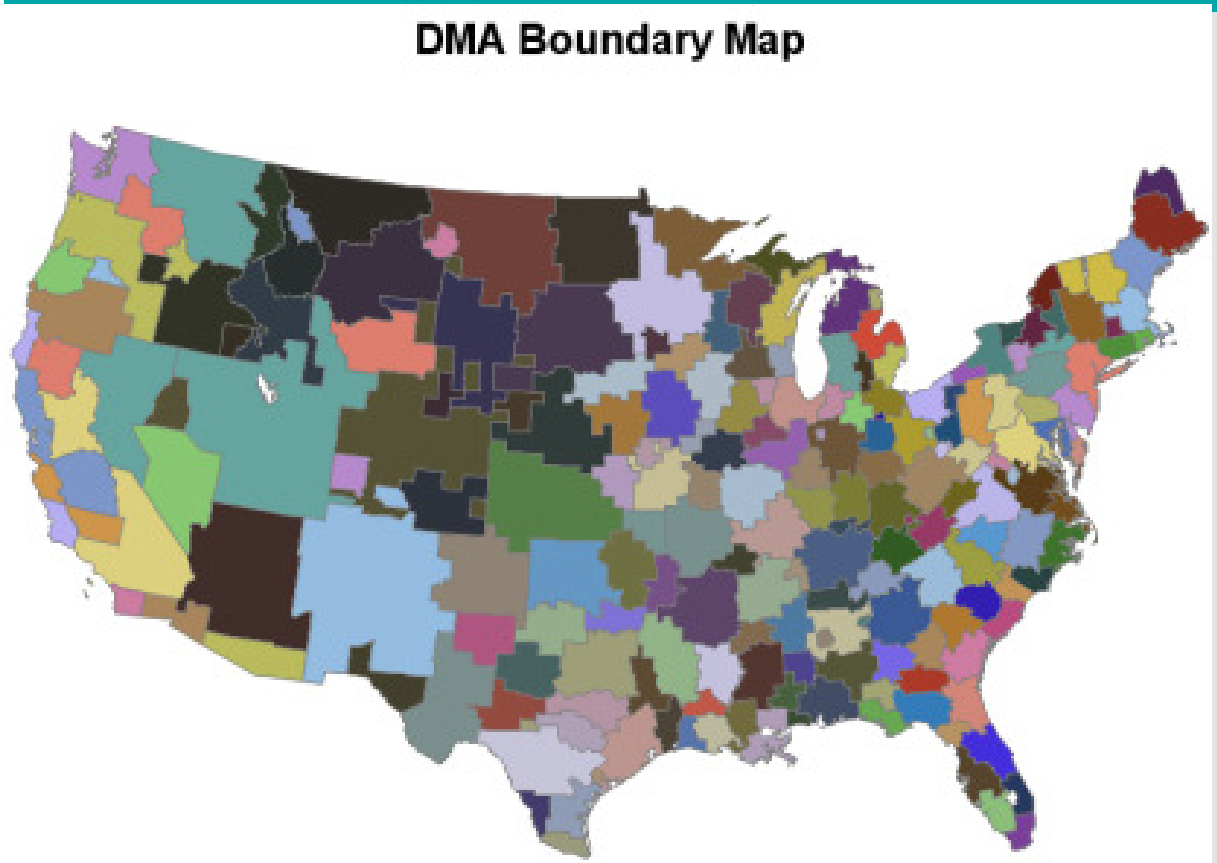
System of Equations = DMA



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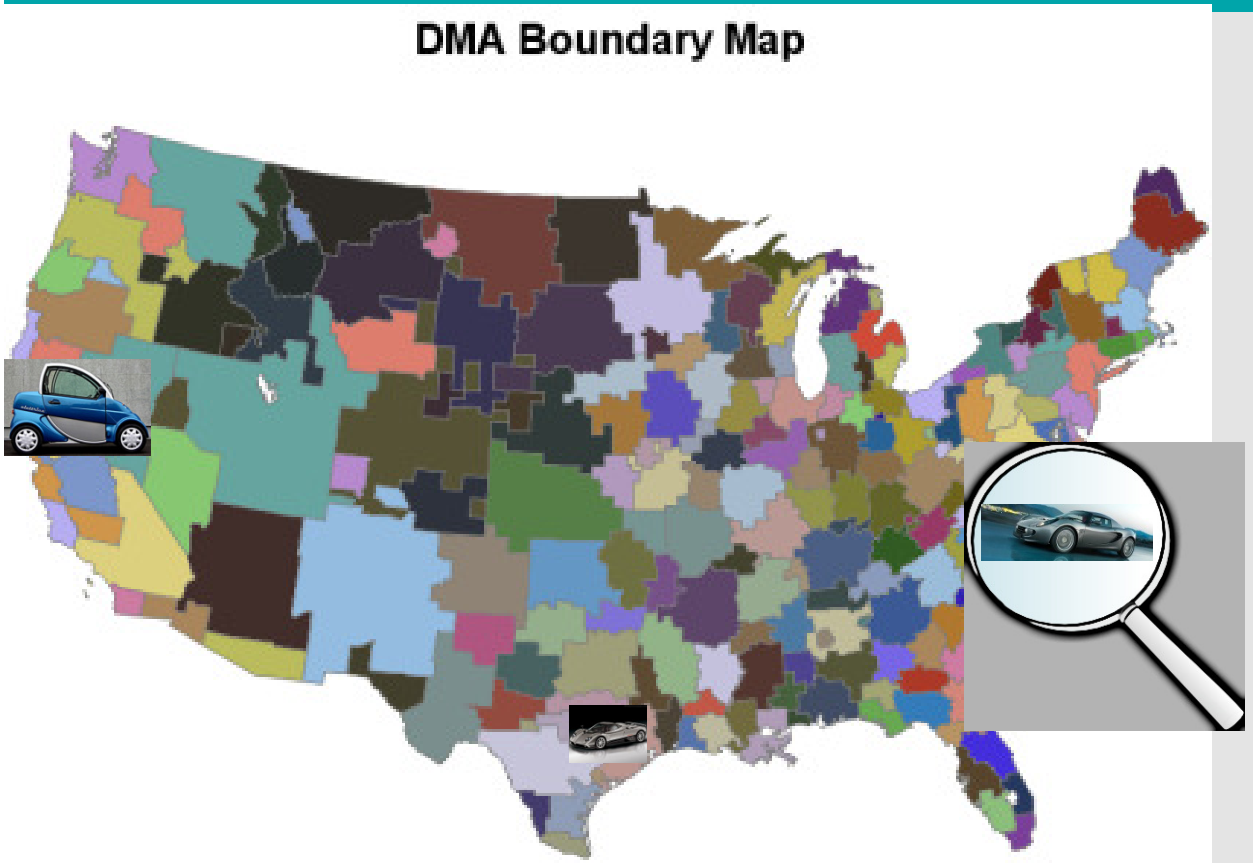
System of Equations = DMA x Product



Product x DMA

DV : DLOG(GQV_BRND_CRD)
Date: 10/12/10 Time: 04:21
SAMPLE : 1/07/2007 4/25/2010 IF X_PID_KEEP AND X_ACTIVE=""Sales
PERIODS : 166
C_SECTION : 45
OBSERVATION :7470
C,-0.001662,0.003390,-0.490416
DLOG(DM_ACQ_PH_QP(-2)+1),0.003098,0.002026,1.529200
DLOG(MC2_OOH_CITI_SPD(-4)+1),0.009889,0.003011,3.284126
DLOG(MC2_TV_CITI_GRP(-4)+(MC2_TV_CITI_GRP(-4)=0)),0.003607,0.002298,1.569751
HOL_LABOR(1),-0.111736,0.066085,-1.690803
HOL_THANKS,0.079682,0.022311,3.571398
AR(1),-0.367022,0.077109,-4.759810
R-squared,0.224122
Adjusted R-squared,0.218893
F-statistic,42.86145
Durbin-Watson stat,2.058506
Prob(F-statistic),0.000000

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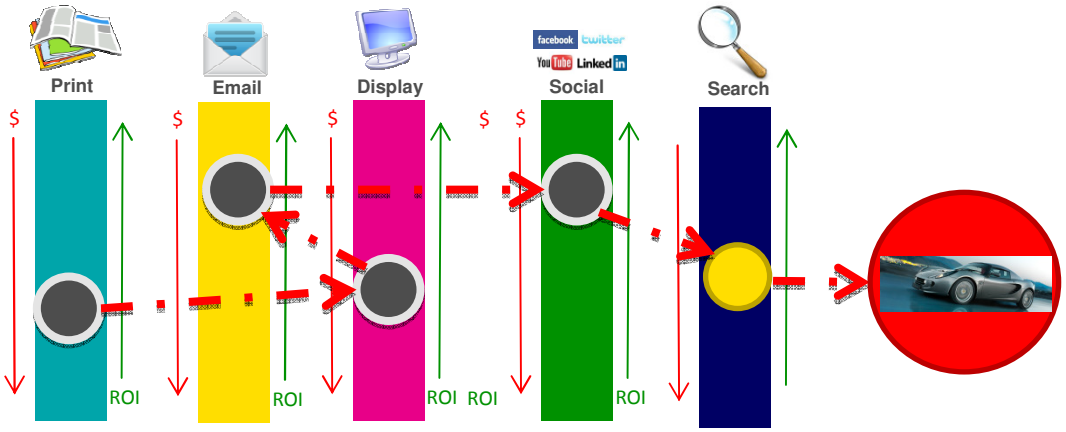
System of Equations = Product x DMA x Media Channels



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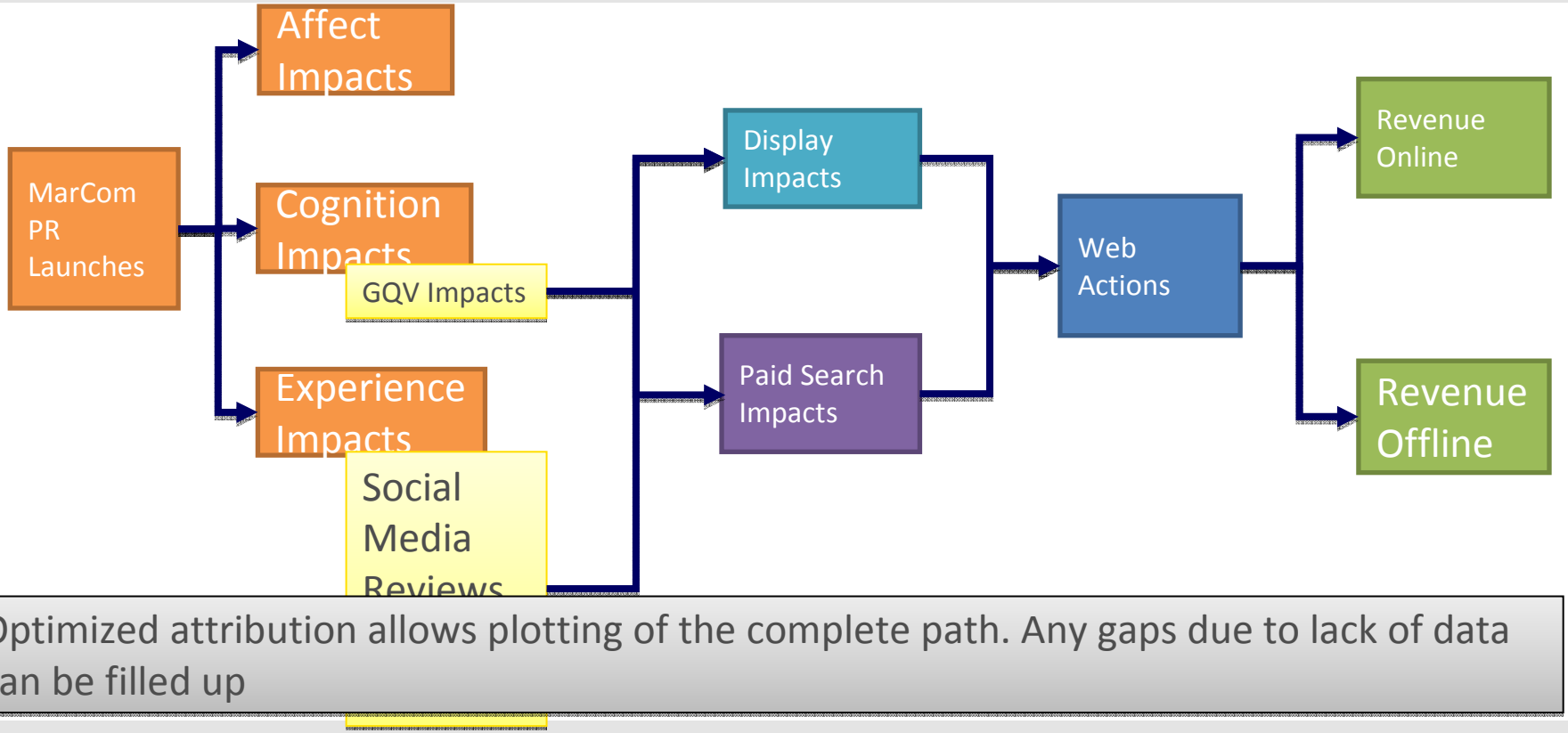
Purchase Paths are complex



Optimized attribution allows plotting of the complete path. Any gaps due to lack of data can be filled up

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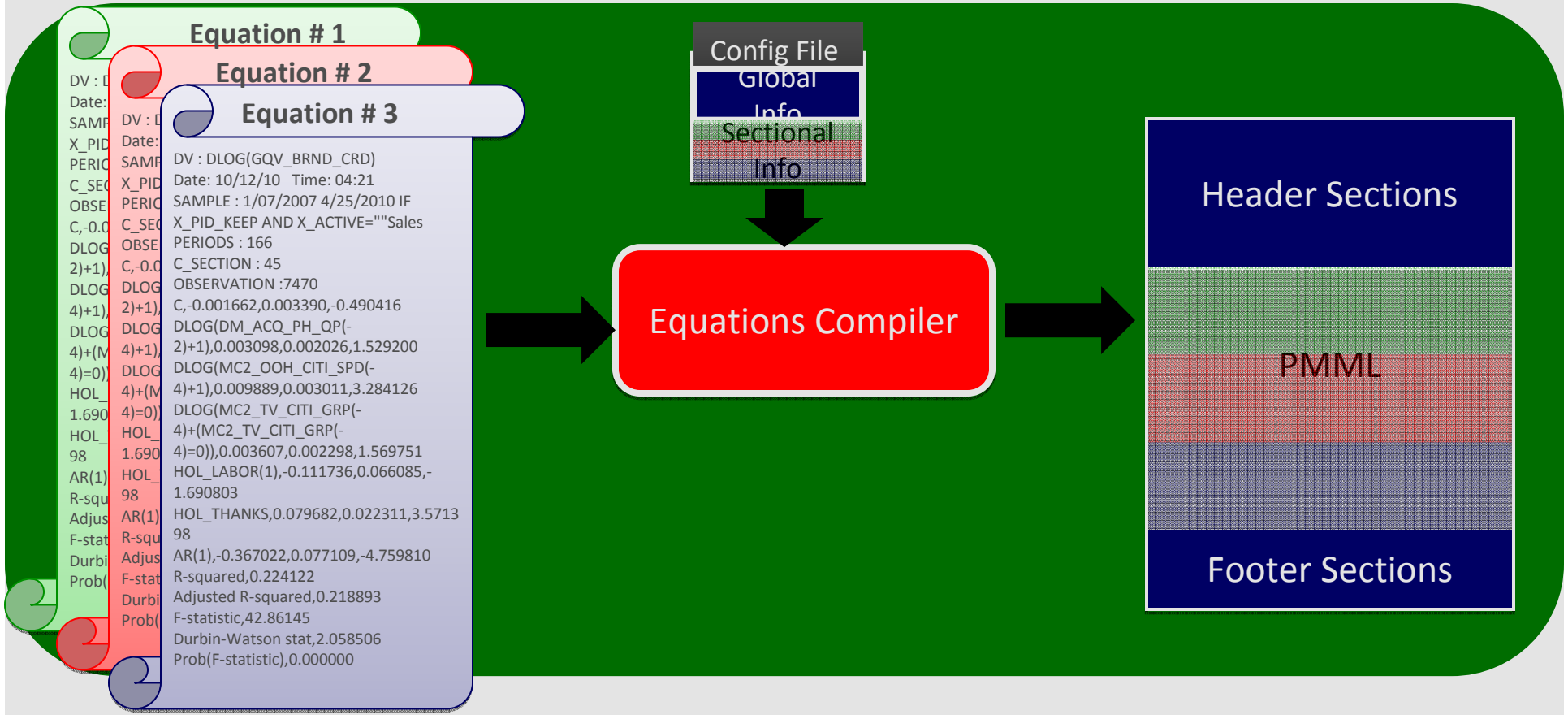
Equation Compiler maintains a System of Equations



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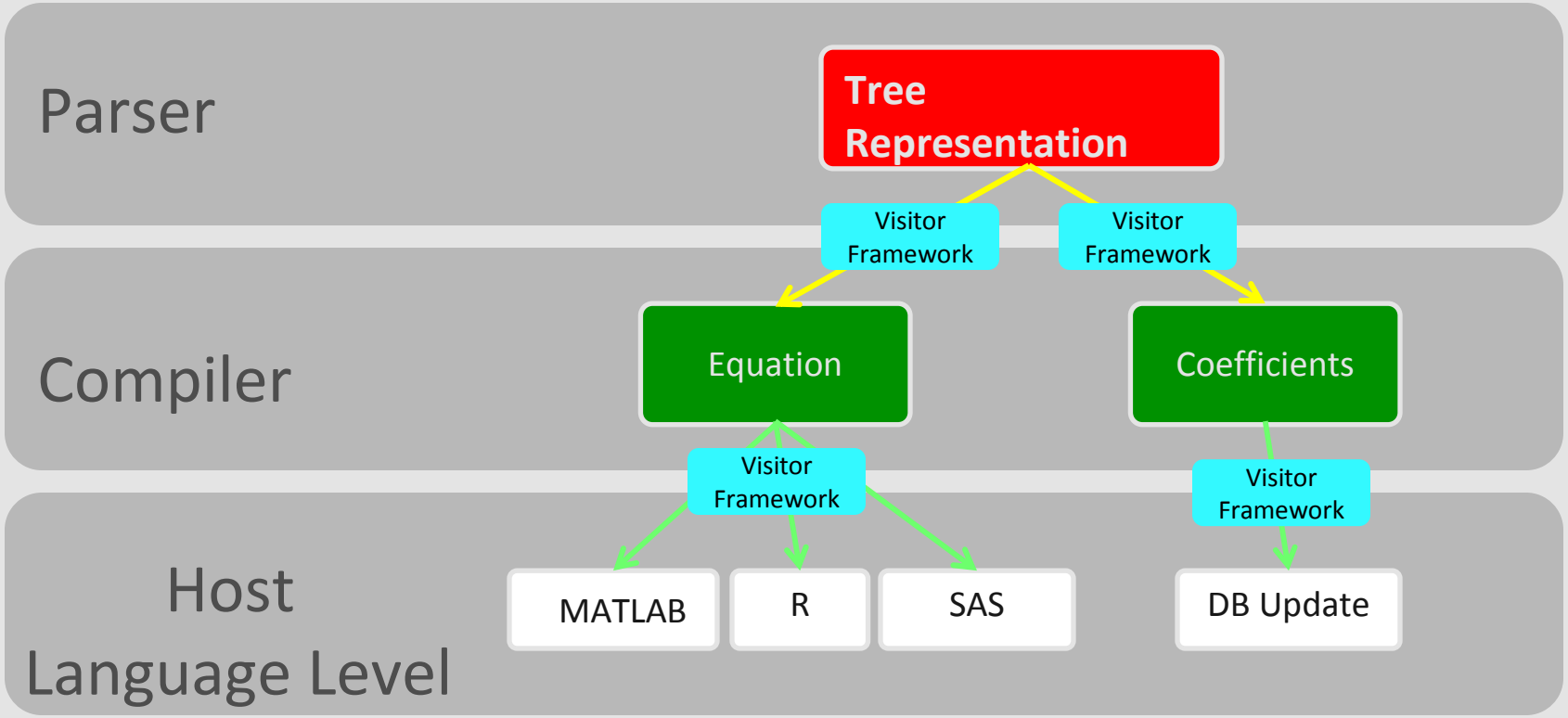
Anatomy of an Equation



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Elastic Modeling

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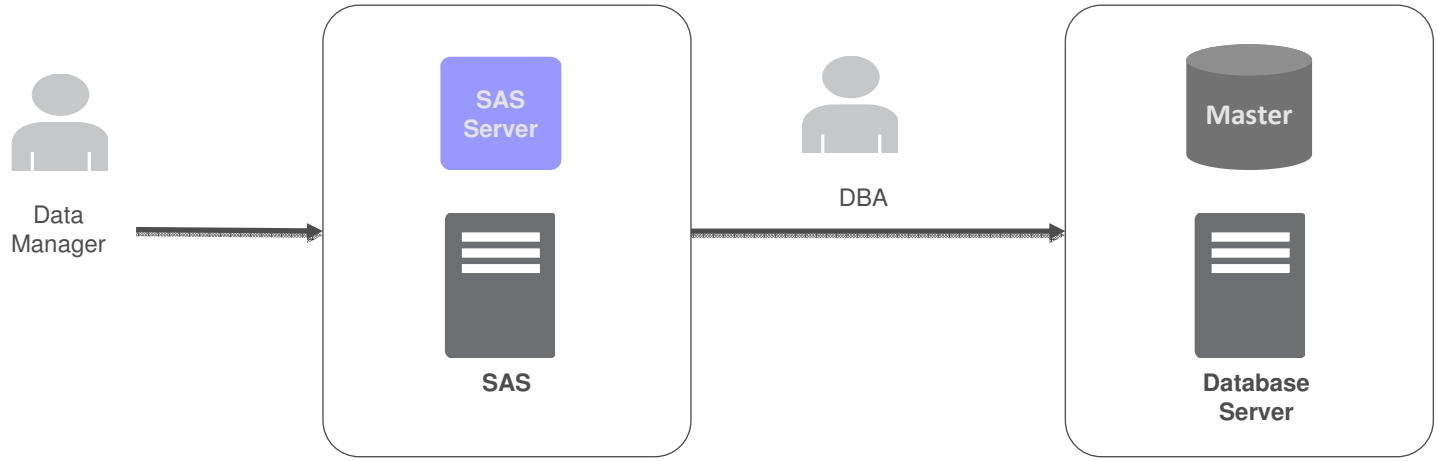
Traditional Data Preparation



Data Transformations

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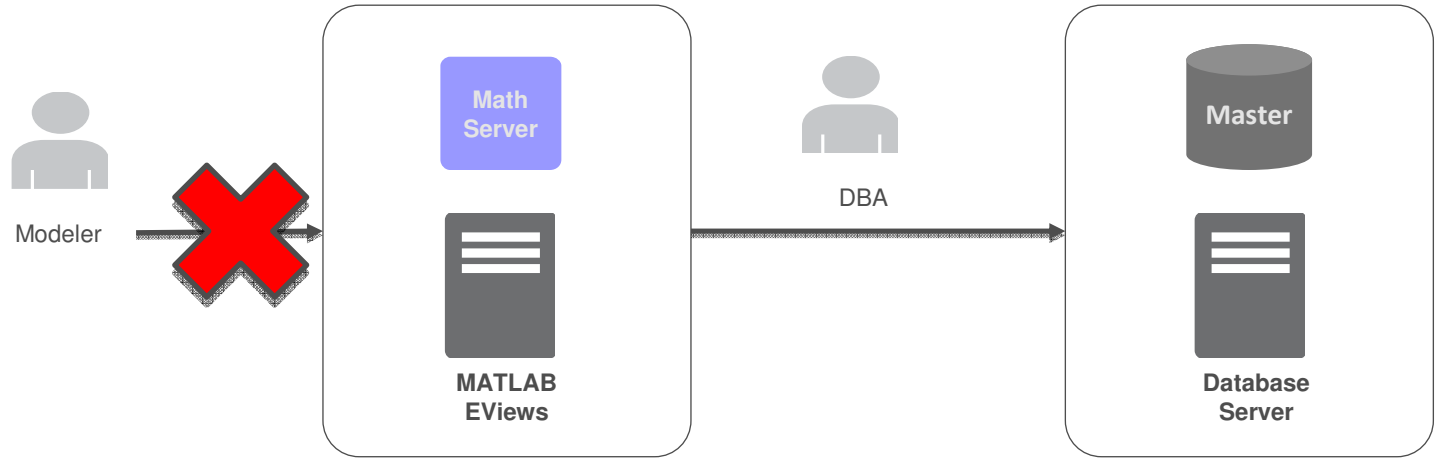
Traditional Modeling architecture



Eliminate accessibility restrictions

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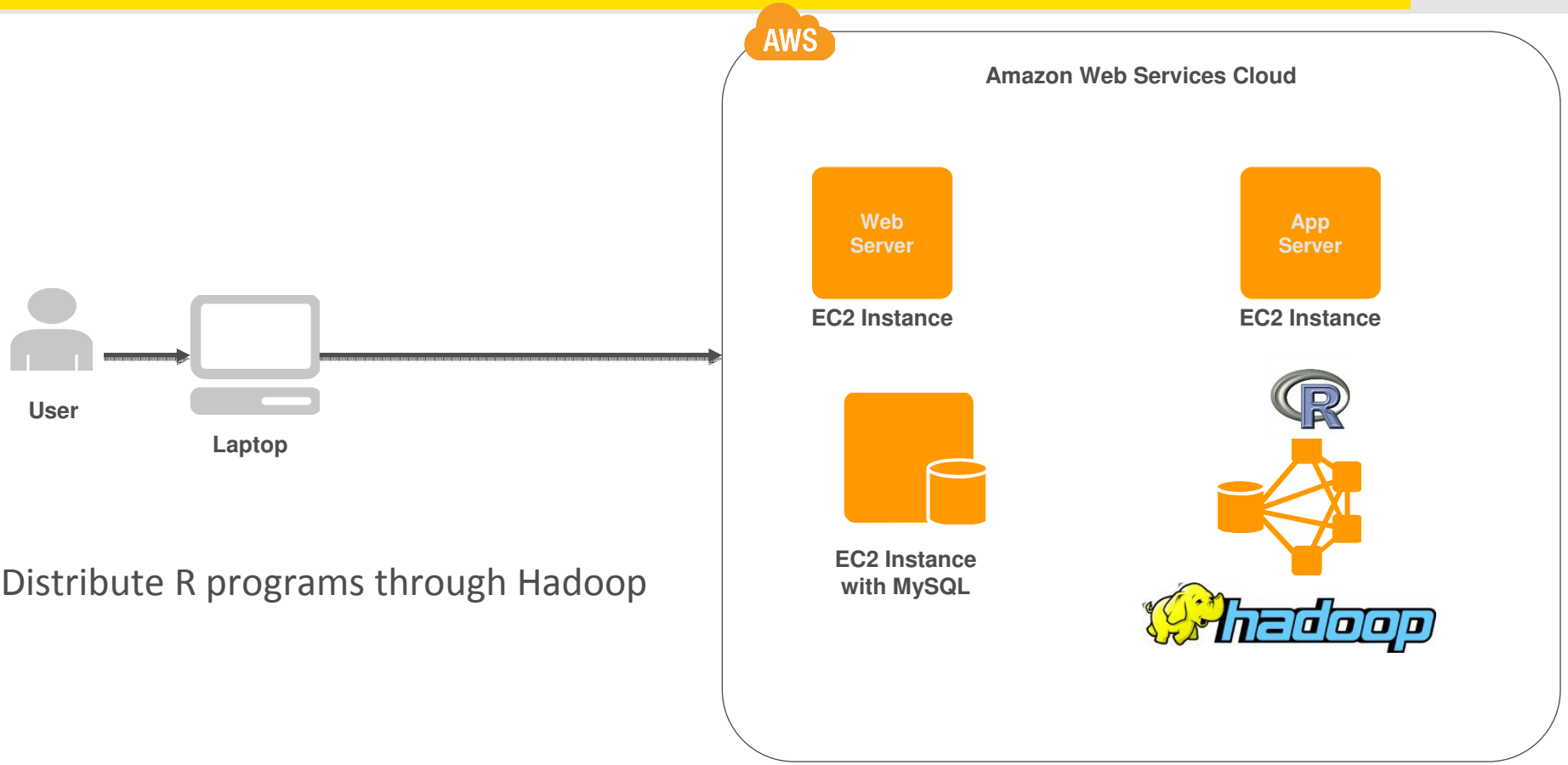
Distributed, Cloud based Modeling



Distribute R programs through Hadoop

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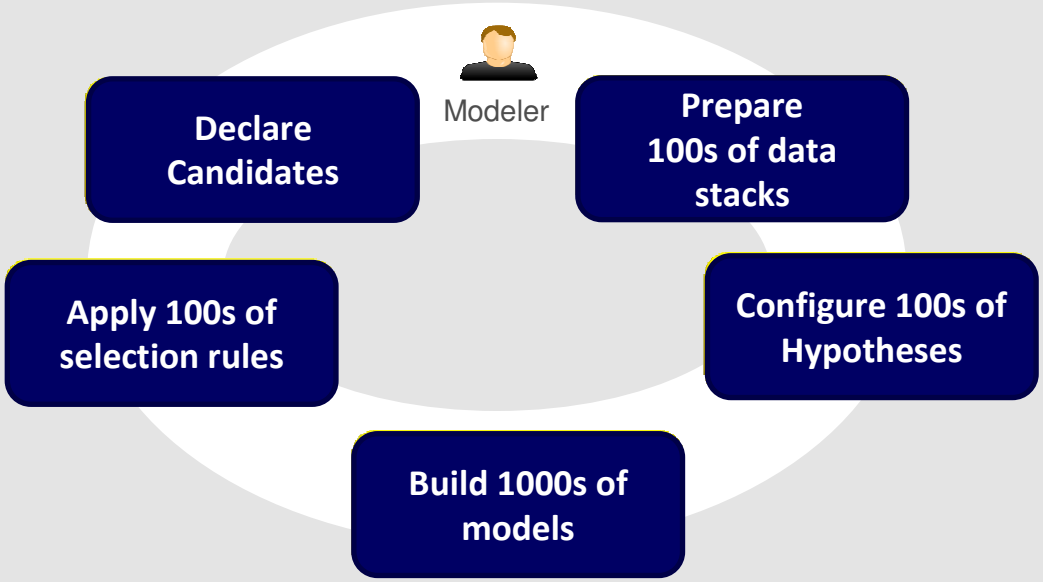
Moving modeling to the cloud



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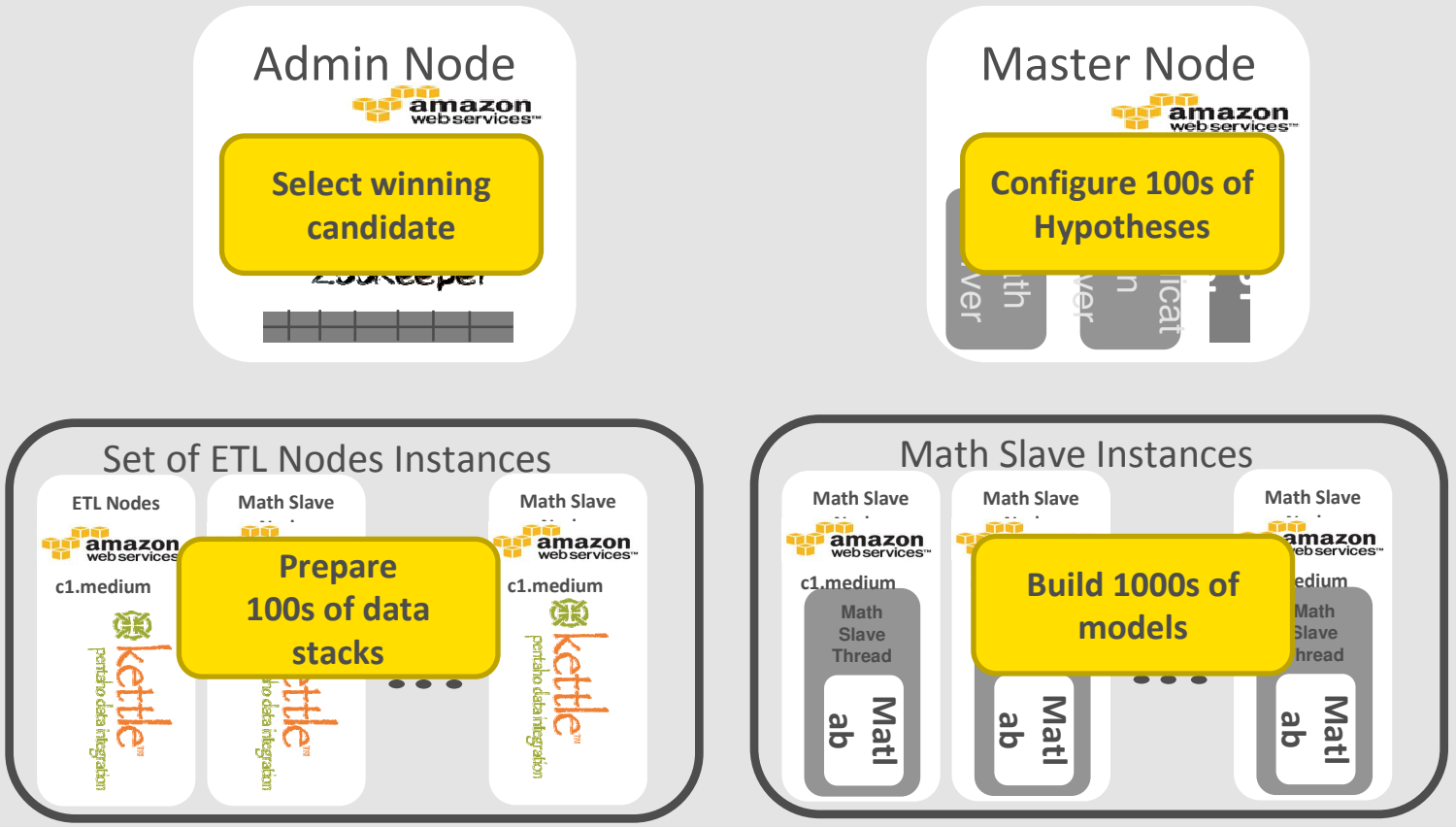
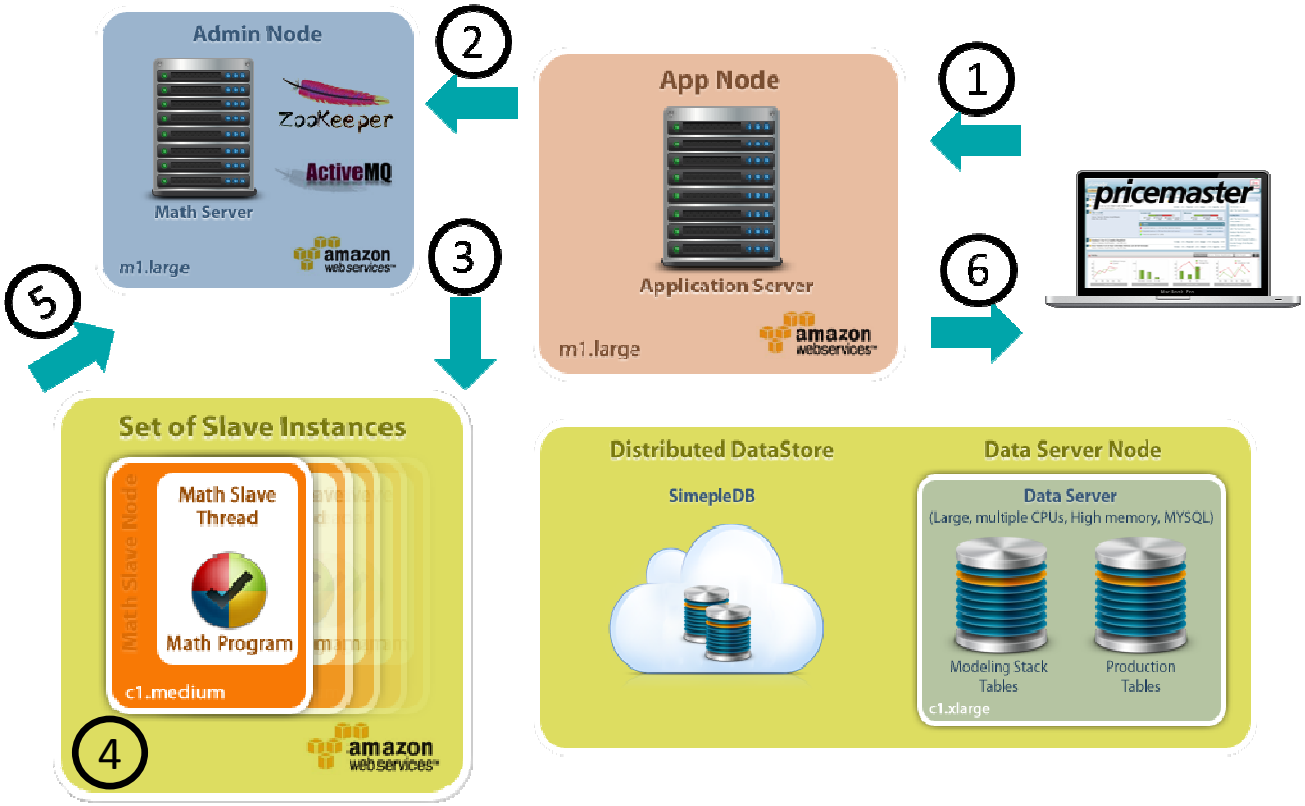
Underlying architecture



Distributed data flow enables unlimited scalability



1. User creates/refreshes a scenario
2. Application server creates a request and queues it with the messaging server
3. Math Slave reads the response
4. Math Slave calls Math Program programs and process the input and output
5. Math Slave queues response back with zookeeper
6. Application Server picks response and responds backs to UI

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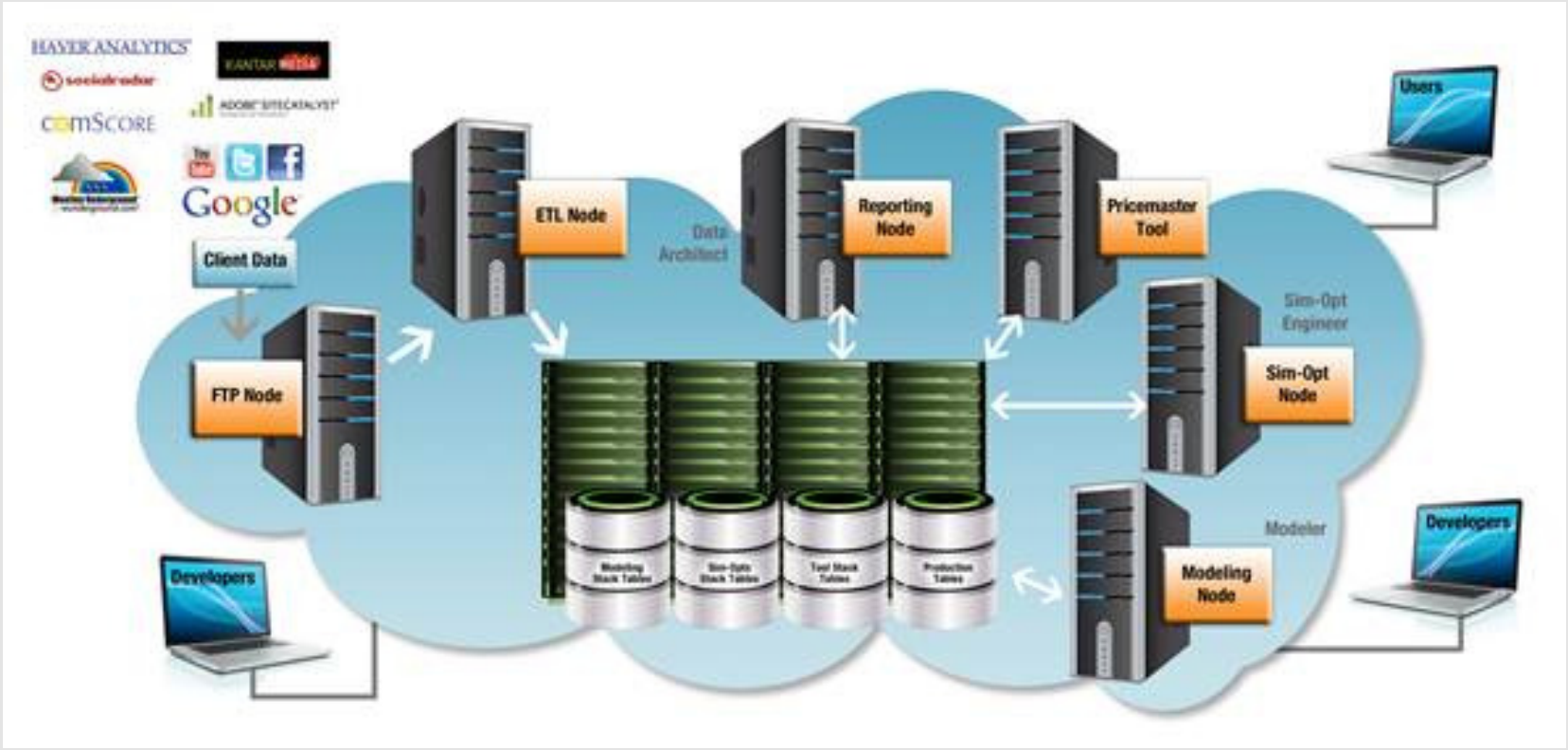
The big picture



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Next Steps

- Lots of challenges in cloud + modeling
- Collaboration opportunities
- We are hiring!