

ALGORITHMS IN LOGIC

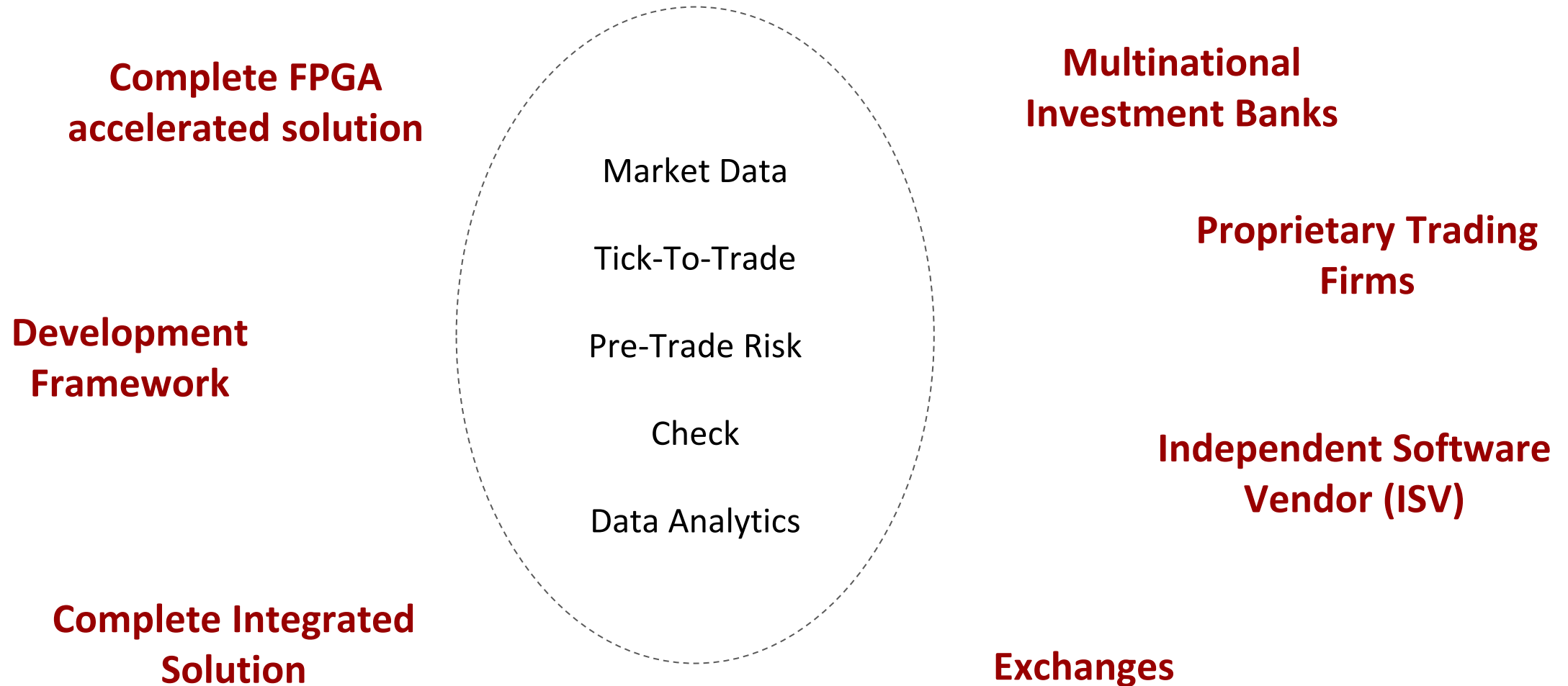


[HTTP://ALGO-LOGIC.COM](http://ALGO-LOGIC.COM)

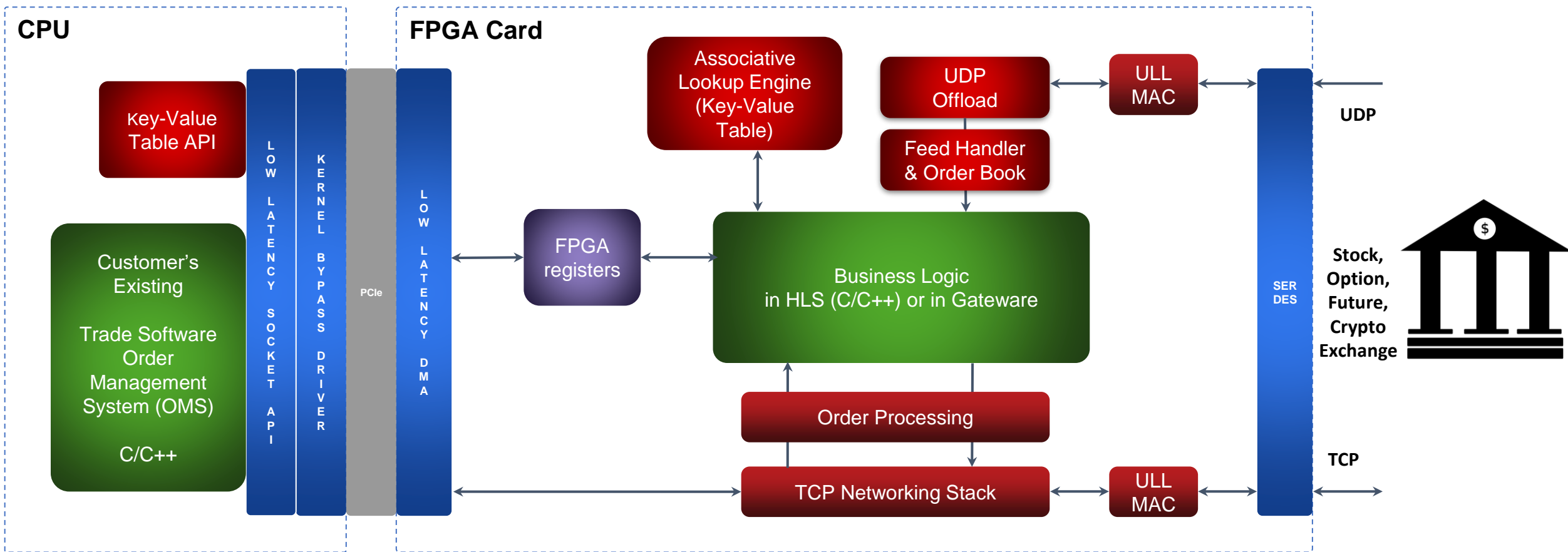
**Algo-Logic / ePOP Delivering
Fast Time-To-First Trade with FPGA Acceleration**

Algo-Logic Systems, Inc.
STAC Chicago Fall 2022

Algo-Logic Offerings, Products, and Customer Profiles



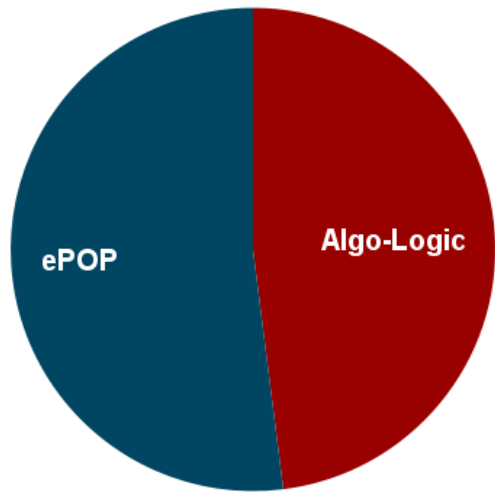
Algo-Logic Framework for FPGA-Accelerated Trading



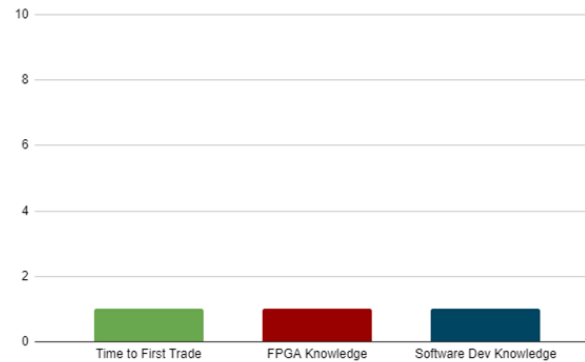
- Algo-Logic IP Cores
- NIC vendor kernel-bypass software driver
- Customer Software and Business Logic



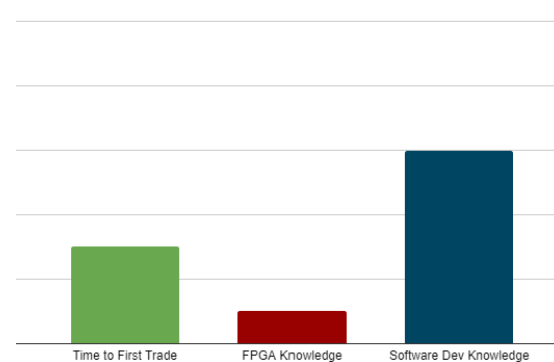
Algo-Logic / ePOP Customer Engagement Alternatives



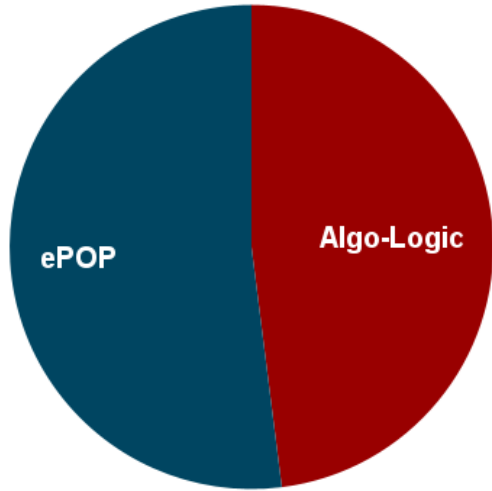
Integrated End-to-End Trading Solution



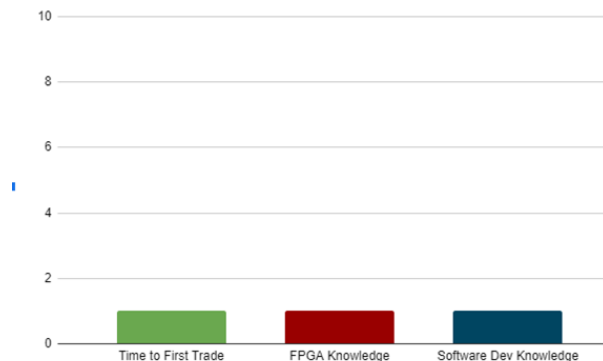
FPGA Accelerated Trading as a Service



Algo-Logic / ePOP End-to-End Trading Solution



Integrated End-to-End Trading Solution



- Very fast Time to First Trade
 - Typical will be <1 week for an established Trading Firm and may be as low as 1-2 days
- No FPGA Knowledge Required
 - Any hardware changes required will be executed by Algo-Logic and FB Lab
- No OMS (Order Management Software) Knowledge Required
 - OMS software will be ePOP which was developed by FB Lab

Integrated End-to-End Solution

- **Ultra-Low Latency Trading System with Electronic Eye, Auto-Hedge, Auto-Quote, and Contingent Offers**
- **Easy and fast path to bring FPGA Acceleration into your Trading environment**
 - Can be used for Algorithmic Trading as well as Point-and-Click execution
 - Includes ability for FCMs to directly manage risk
- **No development effort required to begin trading**
 - Customization to optimize for your proprietary trading strategies available
- **One monthly invoice for everything**
 - Co-Location charges, charges to access ePOP OMS, charges for FPGA Acceleration
- **Low Cost 30 day Evaluation Program for a Try and Buy**

ePOP Software

Layout Layout2 Triggers Triggers+ Stats All

ZN Futures*	BidQ	Bid	Ask	AskQ	Last	Chg.	Volume
M	1018	121290	121295	707	121295	-305	876,471

ZB Futures*	BidQ	Bid	Ask	AskQ	Last	Chg.	Volume
M	221	148120	148130	56	148130	-1210	140,227

ZF Futures*	BidQ	Bid	Ask	AskQ	Last	Chg.	Volume
M	678	113300	113305	739	113302	-237	578,361

ZT Futures*	BidQ	Bid	Ask	AskQ	Last	Chg.	Volume
M	558	105210	105211	231	105211	-96	241,061

Active Trigger Instances									

CONTRACTS | SPREADS | TRADES | POSITION | SKEW | GRAPHS | SETTINGS | EXIT
 OPTIONS (1) | OPTIONS (2) | OPTIONS (3) | CUSTOM | FUTURES | SUMMARY | GREEKS | SHEETS

MINIMIZE

[* ZN M]

Bid Size	Ask Size
122015	1011
122010	1030
122005	1064
122000	1072
121315	1092
121310	1192
121305	1317 (48)
121300	1514 (72)
121295	1607
121290	1018
121285	2002 (45)
121280	2249 (74)
121275	1633
121270	1799
121265	1620
121260	1747
121255	1587
121250	2720

121290 / 121295
 1 1018 x 707
 122280 (-305)

1
2
5
10
25
50
100
500
0
Clear
Buy Stop
Sell Stop
Buy w/ tick
Sell w/ tick
COMBINE
Total: 64
Profit: 33
Loss: 0
Jump: 2.5

[* ZB M]

Bid Size	Ask Size
148210	208
148200	206
148190	319
148180	320
148170	271
148160	208 (4)
148150	270 (8)
148140	201
148130	98
148120	221
148110	319
148100	296 (3)
148090	274 (7)
148080	282
148070	272
148060	196
148050	169
148040	213

148120 / 148130
 221 x 56 3
 150020 (-1210)

1
2
5
10
25
50
100
500
2
Clear
Buy Stop
Sell Stop
Buy w/ tick
Sell w/ tick
COMBINE
Total: 13
Profit: 4
Loss: 0
Jump: 2.5

[* ZN M / ZB M]

Bid Size	Ask Size
0.8224	
0.8223	207
0.8222	138
0.8221	167
0.8220	
0.8219	319
0.8218	
0.8217	221
0.8216	
0.8215	
0.8214	56
0.8213	281
0.8212	
0.8211	269
0.8210	
0.8209	232
0.8208	
0.8207	180

0.8214 / 0.8217
 56 x 221

1
2
5
10
25
50
100
500
0
Clear
Divide

FutPr	ZN Resting Orders	Size	Price	Delta
122040	W1 122.75-121.75 Put Spd	257	38	-63
122015	W1 121.5-122.5 Call Spd	-221	34	-76
122014	W1 122.5-121.5 Put Spd	221	30	-78
122010	W2 121.75 Put	250	28	-45
122005	K 122.75-123.25 Strangle	251	139	-43
122000	W2 122.75 Put	224	100	-75
121290	W1 122-121.5 Put Spd	-251	11	41
121280	K 122.75-123.25 Strangle	-251	142	43
121275	M 121.5-127 Strangle	-251	117	41
121260	W1 122.25-121.25 Put Spd	-228	28	73
121240	W1 122.25-121.5 Put Spd	-258	28	62
121240	W1 122-121 Put Spd	-320	19	56

If -45 ZN M @ 122010 is filled, sell 100 OZN W2
 121.75 Put @ 28

Fill Trigger / W2 121.75 Put

Com	FCP	Month	Quantity	Strike	Price
Order	ZN	F	M	-45	122010
Hedge	OZN	P	W1	-100	121.75

Submit Contingent Clear FPGA

LIMIT
MKT
MKT LIMIT
STOP
STOP LIMIT
FAK
CXL

Trade Triggers (FPGA and Non-FPGA)

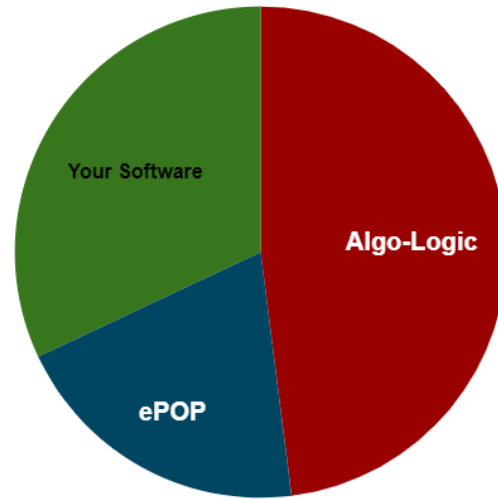
Fill	Price	Sweep	Large Trade
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Time	All Our Last Trades	Price (Then)	Futures	P/L	User
08:21:02	*ZF K 114.5-113.75 Put Sp..	+250 @ 240 (+0.4)	113310	25,000	tod
08:21:01	ZF M	+50 @ 113305			tod
08:19:26	ZF M	-38 @ 113307			mat
08:19:25	*ZF K 114.5 Call	+106 @ 220 (-3.5)	113312	10,750	mat
08:13:42	ZN M	-3 @ 121295			tod
08:13:40	*ZN W1 121.5 Put	-21 @ 3 (+0.5)	121295	175	tod
08:13:40	ZN M	-1 @ 121295			tod

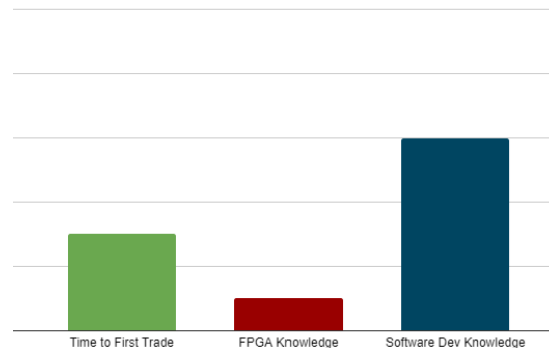
Home Back Next End

Algo-Logic / ePOP FPGA as a Service

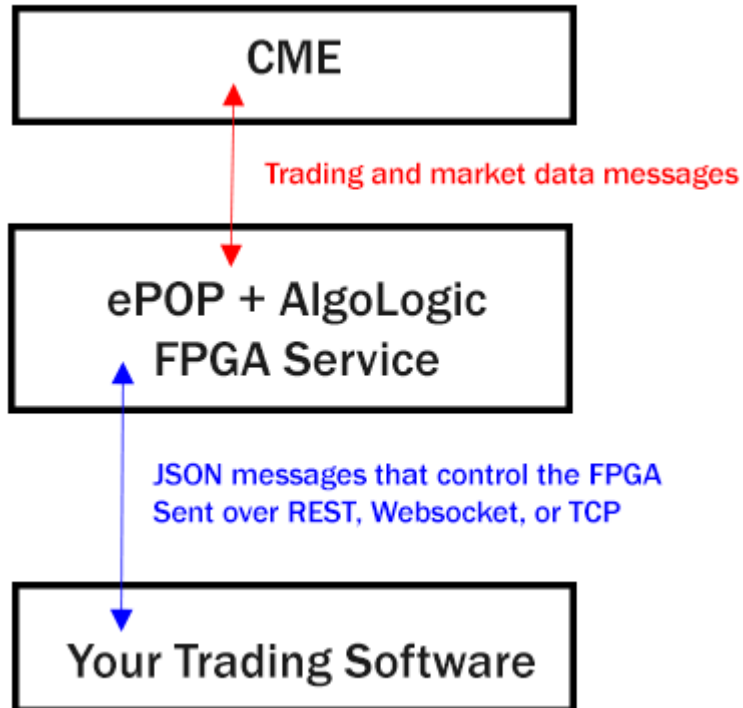
- Time to First Trade will typically be < 1 month
 - In some cases will be as low as 1 week
- No FPGA Knowledge Required
 - Any hardware changes required will be executed by Algo-Logic and FB Lab
- Knowledge of Proprietary Software will be required
 - Need to redirect calls to ePOP APIs



FPGA Accelerated Trading
as a Service



Controlling the FPGA



- **REST**

- Allows Client to load triggers and request open orders using curl or system calls.
- Requires least amount of development time/expertise

- **Websockets**

- Allows Client software to establish a persistent connection to the FPGA service to load triggers and request open order requests

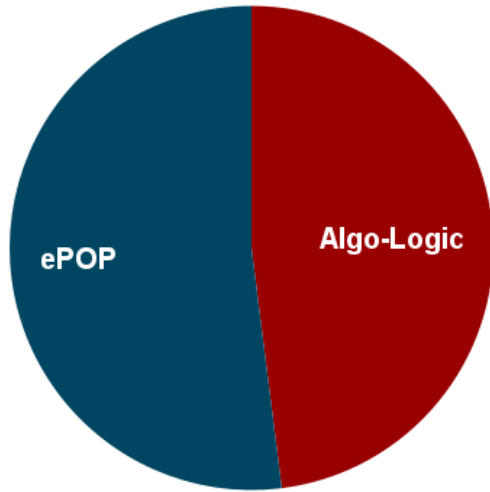
- **TCP**

- Allows Client software to add triggers and and to request open orders using simple TCP connections similar to standard TCP FIX
- This method is ideal for integration directly into existing trading platform or tools

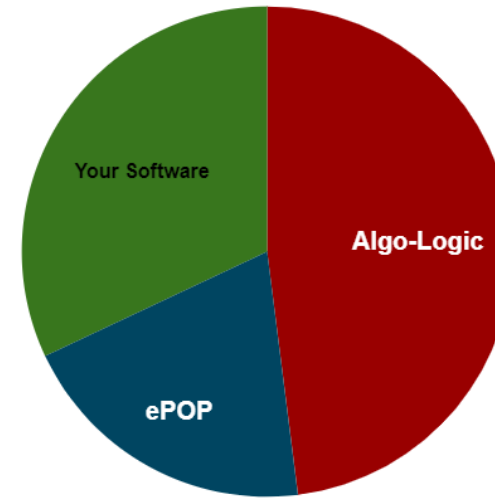
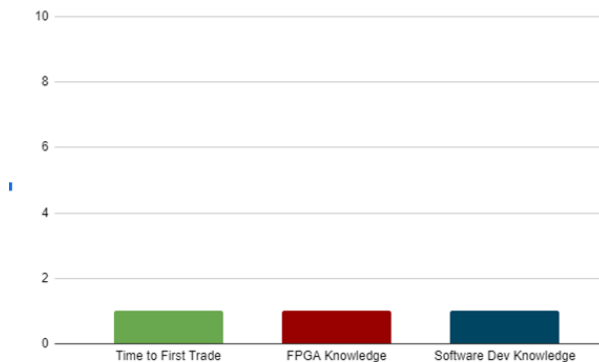
FPGA as a Service

- **Simple Integration with your existing Trading Applications**
- **Easy - transition for your Traders because the User Interface is the same**
- **Fast - Time to First Trade system integration can be completed in less than a month**

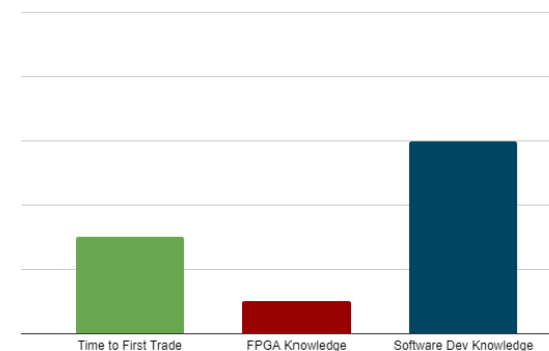
Algo-Logic / ePOP Customer Engagement Alternatives



Integrated End-to-End Trading Solution



FPGA Accelerated Trading as a Service



Client View of the Value of FPGA Acceleration?

Client compare two trading systems:

- Software only, vs.
- Software plus Algo-Logic FPGA Acceleration

Results

- Software system hit intended Hedge **53%** of the time, while
- FPGA Accelerated system hit **95%** of the time.

With FPGA Acceleration

- Hit ratio on hedge improved **2:1**
- And used more often and with larger quantities

Conclusions: Algo-Logic Offers Ultra-Low-Latency

- **Algo-Logic:**
 - Delivers innovative FPGA based accelerated solution for financial trading
 - With FB Lab's ePOP software we provide complete, FPGA accelerated Tick-to-Trade solution
 - With our End-to-End and FPGA as a Service approaches we provide a very fast path to integrate FPGA acceleration into your trades
- **Call or email us and ask about our low cost 30 day evaluation**



Web: <https://Algo-Logic.com>

Twitter: [@Algo_Logic_Inc](https://twitter.com/Algo_Logic_Inc)

Phone: (408) 707-3740

Email: Solutions@Algo-Logic.com

Check box to have us contact you