Technology Careers in HFT

Brennan Hughes
Partner
WWFIRS, LLC
312.924.1458
bhughes@wwfirs.com

WHAT IS HIGH FREQUENCY TRADING?

A program trading platform that uses powerful computers to transact a large number of orders at very fast speeds. High-frequency trading uses complex algorithms to analyze multiple markets and execute orders based on market conditions. Typically, the traders with the fastest execution speeds will be more profitable than traders with slower execution speeds.

http://www.investopedia.com/terms/h/high-frequency-trading.asp#axzz2BArBTpy7

WHAT IS HIGH FREQUENCY TRADING?

High frequency trading is a form of automated trading that employs:

(a) algorithms for decision making, order initiation, generation, routing, or execution, for each individual transaction without human direction
(b) (b) low-latency technology that is designed to minimize response times, including proximity and co-location services
(c) high-speed connections to markets for order entry
(d) high message rates (orders, quotes, or cancellations).

http://www.cftc.gov/ucm/groups/public/@newsroom/documents/file/wg1presentation062012.pdf

CAREER PATHS: LESSONS

Interviewing is a skill; and the process is not personal

Take big risks, especially early on

Leave when you can't make it work

Always develop new skills

Your career is utterly non-linear

HIGH FREQUENCY TRADING TECHNOLOGY TRENDS

- Ultra-low latency networking and OS software
  - In 2012 the leading firms are on the microwave line – beating out fiber – and optimizing technology at the nano-second level
  - Rebuilding/rewriting OTS software and systems
- Co-location of servers at the data center to reduce transmission latency
- Customized Hardware/Software based solutions
  - FPGA, ASIC, and Infiniband solutions
  - Linux Kernel Performance Tuning and Optimization
- Massively Parallel and Distributed systems
- Data Management systems
  - Scalable databases, capable of managing peta-bytes worth of data
  - Leveraging internet scale data analysis tools: Hadoop & MapReduce
  - Many firms building advanced research platforms

LATENCY

Time delay between the moment something is initiated, and the moment one of its effects begins or becomes detectable

- System Latency
- Simulation Latency
- Networking Latency

LATENCY OF HFT PROCESSES

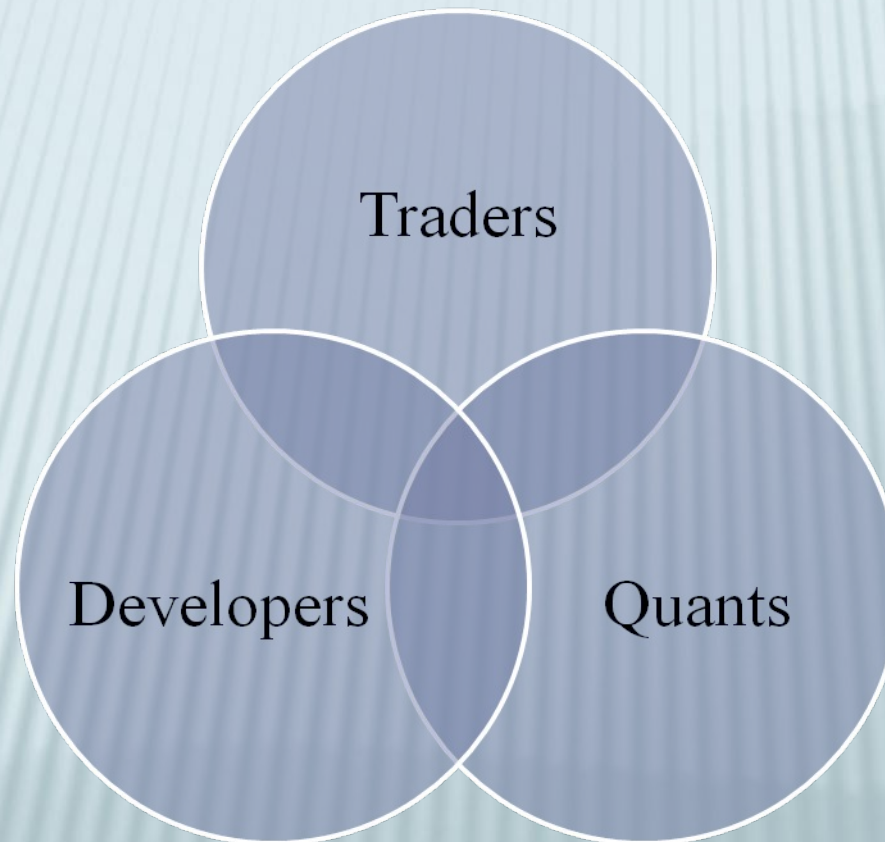| Market Speed	Details	Market Function
310us	Orders acknowledged in average of 310 millionths of second, includes transit time from the entry point to ISE's network through the matching engine and back.	International Securities Exchange
191us	The time it takes to accept, process and acknowledge or fill a member order, the complete round trip from firewall to FIX handler to matching engine and back.	BATS Exchange
59us	The time it takes to accept, process, and acknowledge or fill an order.	Nasdaq Stock Market
5us	Check Point Software, The time it takes to accept, process and acknowledge, Moves 110 billion bits of information a second through a firewall , Utilizes 108 core processors, Involves as many as 300,000 connections per second	Data Security Checks
4us	Trading Physics, feeds include all orders placed for equities listed on five exchanges: the New York Stock Exchange, NYSE Arca, Nasdaq Stock Market, BATS Global Markets and Direct Edge.	Market Depth Normalized
2us	Mellanox Technologies, transfer between two sockets on same network.	Message Transfer
1us	NovaSparks, computations take no longer than one microsecond, regardless of volume of data; normalizes and formats data, Inputs and deletes trade data.	Data Feed Handling
600ns	QuantHouse; uses field programmable gate arrays; "Offloads" the processing of market data from other tasks.	Market Data Processing
250ns	Lime Brokerage; checks for trade amounts, available credit, other thresholds, benchmark average of less than 250 nanoseconds of added latency	Pre-Trade Rick Checks
10ns	Symmetricom; one million time readings a second; accuracy within 600 nanoseconds; all servers in network synchronized to within 10 nanoseconds of each other.	System Synchronization

One Second Peak Message Rates and Time of Peak per Trading Day

Date	Peak Msg/Sec	Time EST
2011-04-01	3,571,803	16:00:00
2011-04-04	3,139,238	16:00:00
2011-04-05	3,163,719	16:00:00
2011-04-06	3,497,465	16:00:00
2011-04-07	3,425,031	9:30:01
2011-04-08	3,633,505	9:30:01
2011-04-11	2,971,490	9:30:01
2011-04-12	3,001,597	9:30:01
2011-04-13	3,232,508	9:30:01
2011-04-14	3,208,546	9:30:01
2011-04-15	3,179,468	9:30:01
2011-04-18	3,095,444	16:00:00
2011-04-19	3,506,451	16:00:00
2011-04-20	3,129,871	16:00:00
2011-04-21	3,244,649	9:30:01
2011-04-25	3,333,192	9:30:01
2011-04-26	3,226,916	16:00:01
2011-04-27	3,469,255	16:00:01
2011-04-28	3,522,786	16:00:00
2011-04-29	4,159,537	16:00:00

DEVELOPERS

Infrastructure Developers

- Experts in C/C++ or Java on Linux
- Advanced knowledge of algorithms and data structures
- Parallel/distributed computing & HPC
- Advanced performance tuning and optimizations of kernel and network systems

Trading Platform Developers

- Design, architecture, and development of trading systems.
- Experts in C++ or Java, on Linux OS
- Interface with Traders, Quants, and infrastructure developers to understand system requirements.

Front office Developers

- Work with traders and quants to develop trading systems.
- Experts in C++ or Core Java, with significant knowledge of trading strategies, technology, performance tuning and optimization.
- Must have the ability to work with traders.

QUANTS

Quantitative Researcher

- Research, design, and development of quantitative models/strategies
- Heavy emphasis on statistical analysis, machine learning, AI
- Advanced knowledge of large scale data-analysis.
- Software engineering – R, Python, C/C++, Java.
- IMO, Putnam Mathematics, and other matematical competitions

Quantitative Developer

- Development and Implementation of algorithmic trading strategies.
- Exceptional quantitative and programming skills,
- Production quality, high reliability, highly-tuned numerical code.
- Java, C/C++, Python
- Strong knowledge of computational numerical algorithms, linear algebra, and statistical methods for large data sets
- IOI, Battlecode, PokerBot, etc.
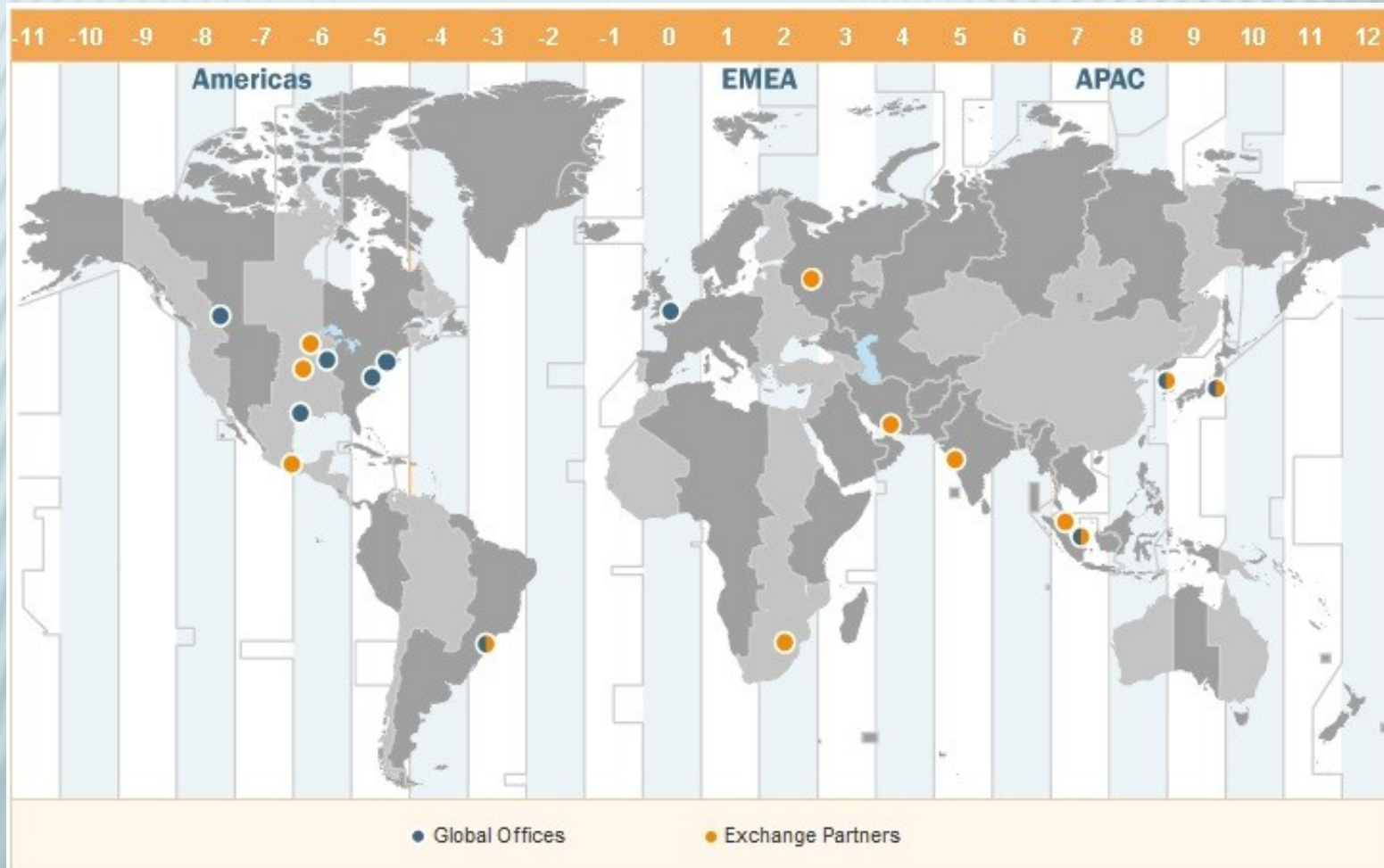
TRADERS

High Frequency Trader

- Executing trades using automated algorithms
- Optimize strategy parameters
- Strategy Research and Analysis
- Implementation and testing of new trading ideas and models.

High Frequency Strategist

- Full life cycle development of HFT strategies.
- Quantitative Research and Analysis.
- Daily management and optimization of trading models.
- Direct responsibility for the P&L (profit and loss) of their desk.

GLOBALIZATION OF HIGH FREQUENCY TRADING

WHAT TO ASK?

- What is the career path for my role within the firm?
- Please tell me some success stories of associates with my background.
- Who at your firm is the best at this role and what makes them the best?
- How are bonuses structured – discretionary or fixed percentage?
- When are bonuses paid?
- Has anyone ever turned down partnership? If so, why?
- Do you have a non-compete and ,if so, is it paid and for how long?
- Where do you see the industry going over the next year?
- How do you see regulation impacting your business?
- Please tell me what products you trade and what exchanges do you trade on?
- How would you rate your technology infrastructure relative to your direct competitors? What recent technology investments have you made?
- Who are the investors in the firm? Are there any Private Equity firms?

WHAT TO ASK?

- What is the trading style here – market making, statistical arbitrage, other?
- Has the firm articulated its values? If so, can you share them with me?
- How low is voluntary turnover? What is the turnover for people like me?
- Will I have a mentor? How often am I reviewed?
- Please describe the culture. Is it team-oriented or more siloed?
- Are bonuses paid out quarterly, semi-annually, annually or some other way?
- What is your firm's competitive advantage?
- How does the firm manage risk?
- Can you tell what you love about your firm?
- What is the biggest challenge you face?
- Will you pay for evening graduate studies in CS, FE, or other related fields?
- What is the total compensation range for my role on average in 1-2 years?

HOW TO LEVERAGE THE TEAM AT WWFIRS THROUGHOUT YOUR CAREER. WE ARE HERE TO HELP.

Stay in touch

- Email, call, send a telegram

  f **WWFIRS**   **t** **@WWFIRS**

- Leverage the relationships and resources that you have

Ask Questions

- Industry Trends
- Companies
- Job Opportunities
- General Advice

High Frequency Trading:
Preparing for and Managing your Career in HFT

Thank you.

We look forward to working with you
throughout your exciting career in the HFT Industry.

Questions?

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Partner
WWFIRS, LLC
312.924.1458
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- Futures Industry Association

- Future and Options Week

- Wall Street and Technology

- Rosenblatt Securities

- John Lothian Newsletter

- http://www.hftreview.com/

- http://www.highfrequencytraders.com