High Frequency Hacking

Some risks of the modern trading practices

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OWASP

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Agenda

- The true story – Flash Crash of the May 6th, 2010
- High Frequecy Trading
- Known Issues
- Less Discussed Issues
- Not trading?
  Never mind, they trade on you...

May 6, 2010 - Flash Crash

Some links related to Flash Crash

- CFTC-SEC report http://www.sec.gov/news/studies/2010/marketevents-report.pdf
- Nanex: http://www.nanex.net/FlashCrash/FlashCrashAnalysis.html
  - In contrast to CFTC-SEC, they focus on data analysis rather than interviews
  - incorrect data feeds were important (saturation – incorrect price)
  - Original 75k E-Mini sale was not a problem, but subsequent re-sales of the HFT parties that initially absorbed the selling presure

High Frequecy Trading

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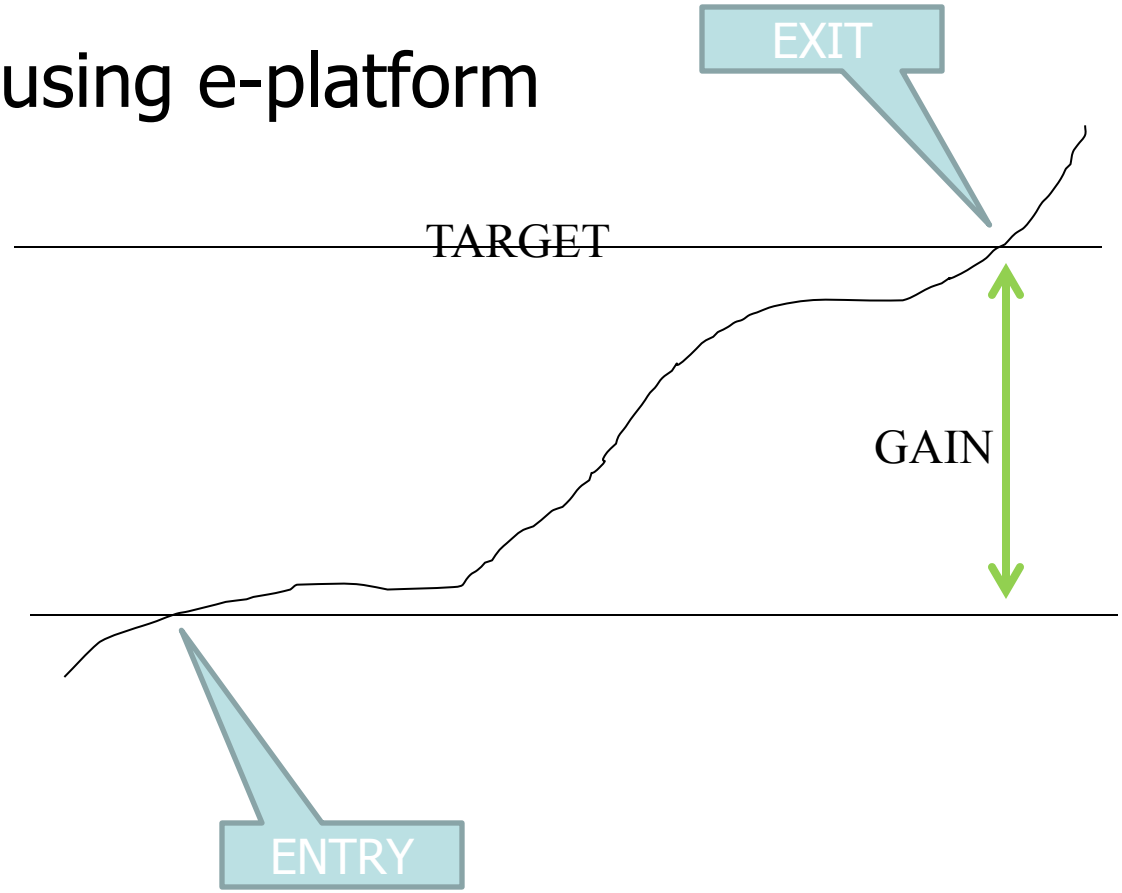
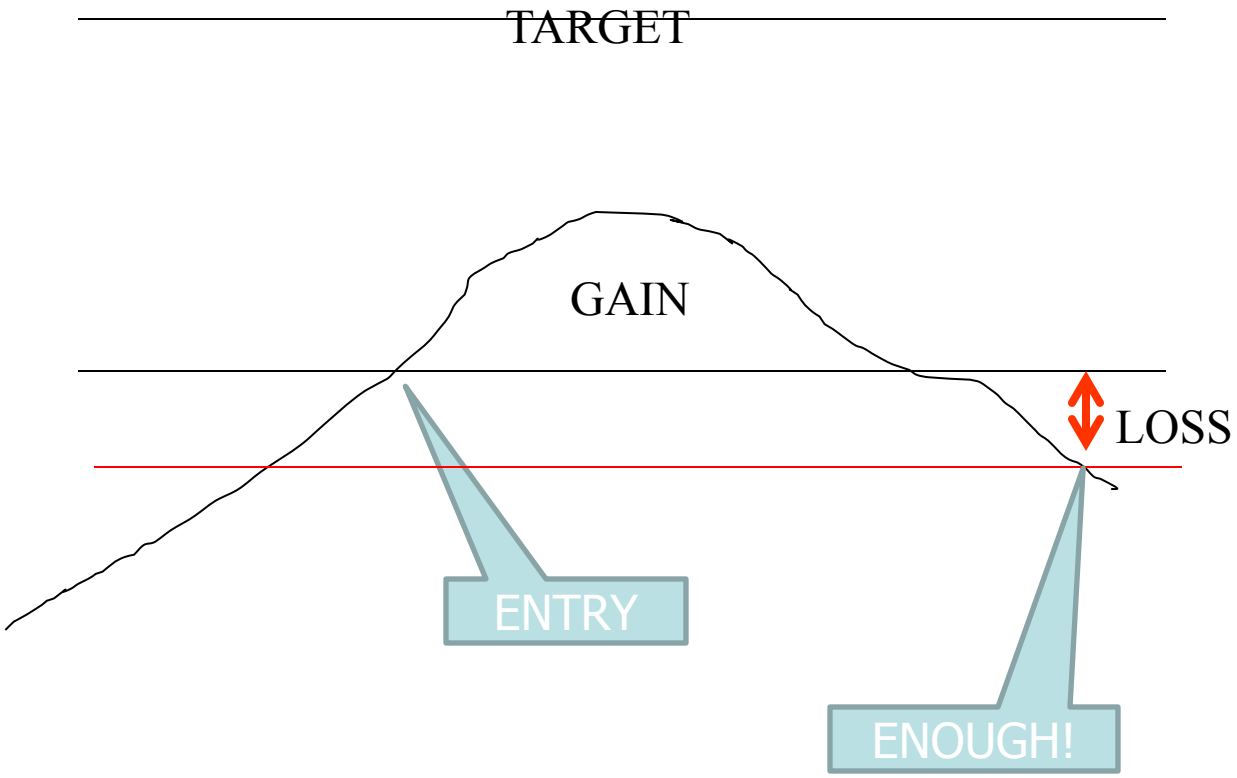
From trading to HFT

- Manual trading using e-platform
  - Limit
  - Stop Loss
- Shorting
- Leverage
- Derivatives
- Arbitrage



- High Speed
- Algorithmic

Stop Loss



Known Issues

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Known Issues

- May 6, 2010: Flash Crash happend
- Jan 2011: Rony Kay, cPacket Networks: Pragmatic Network Latency Engineering Fundamental Facts and Analysis – discusses HFT attacks by deliberately causing latency
  - http://www.cpacket.com/Introduction%20to%20Network%20Latency%20Engineering.pdf
- Black Hat USA and Defcon 2011, James Arlen
  - http://vimeo.com/28794878
  - Latency = direct financial loss in HFT
  - Traditional security (firewalls, AV, IDS...) implies latency
  - Therefore, traditional security countermeasures are non-existent in HFT
- Quote Stuffing
  - Lots of nonsense quotes, just to make other HFT busy -> latency

Less Discussed Issues

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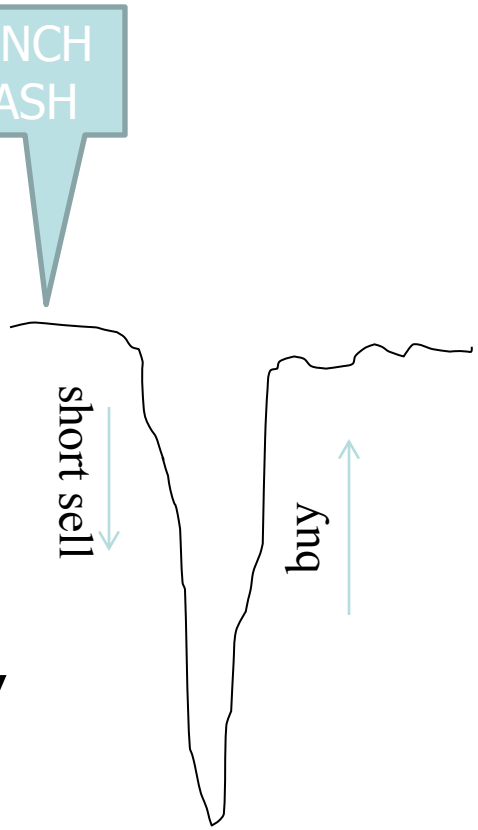
Flash Crash Fraud Scenario

- DON'T DO THIS
- Induce flash crash of target instrument
  - Choose (in)apropriate moment
  - Sell large amount of target instrument
  - Saturate data feeds with quotes that do not make sense
- Short sell while riding down, buy back at pre set target, buy more while climbin up, sell at pre set target
  - Dont get too greedy



Intrusions everywhere in financial world

- No impact widely noticed so far – in several cases
- I remember a warning on a malware tageting certain trading platform in beginning of 2011
- Oct 2011, Nasdaq under attack – speculation about hackers getting to insider info http://www.bloomberg.com/news/2011-03-30/u-s-spy-agency-said-to-focus-its-decrypting-skills-on-nasdaq-cyber-attack.html
- Mar/Feb 2011, Morgan Stanley #1 – Aurora hackers attack – leaked via HBGary
- Jun 2011, IMF under attack http://www.bankinfosecurity.com/articles.php?art_id=3736
- Jun 2011, Bitcoin related attacks http://slo-tech.com/novice/t472678

Maybe some is just building a botnet? I mean a special one, targeting traders ....

Botnet of trader's computers would be useful for the attacker

- Perform coordinated actions from thousands of "owned" user accounts
  - e.g. starting a flash crash you need a substantial funding – this can be crowdsourced to owned accounts
    - or other "campains" to influence the price of something
  - DoS users; providers; stock exchanges
  - Stealth quote stuffing – poor man's (attacker's) compensation for HFT technology
  - Use your imagination for further use cases ...
  - Get info on the trading strategies that are not part of public order book – where is your stop loss set you said?
    - BTW Q for statistic freaks: what %/count is the representative sample for entire trading population?
- HFT – hi speed trading engines cannot be directly controlled by botnet due to technical limitations (botnet is on "standard" tech), but "control station" can

Less Discussed Issues

- DoS during big changes affects user
  - recent EUR/CHF 10% rise in minutes
- Stop loss effectiveness when under DoS
- Trading fraud vs. e-banking fraud
  - Hardly notified malicious intent
  - Probably because the traders are inherently malicious to each other
- Trading Flavour Salami attack
- Follow me to hell
- Reverse ingeneering trading algoritms, finding security vulnerabilities – is this actually market analysis? Evolution: fundamental, technical, algocentric

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They trade on you

- Index does not reflect the market anymore
  - index impacts the market – DJIA during the Flash Crash
  - ... and some suggest that solution against Flash Crash is introducing another tradable index (VPIN)
- Not trading? You are affected anyway
  - The probability of your countries public finance default is most likely subject to trade
  - Have debt in CHF? Wellcome to the club.
  - Is EUR, USD, <put your choice here> your currency? It's subject to trading with other currencies (FOREX)
  - Need oil for heating and mobility? Your next's years oil expenses are in large part subject to speculative financial markets.
  - Still not affected? Congratulations. Probably you are one of those not using mobile phone? Living on a bio-dinamic self-sufficient farm? OK, that makes sense...
  - BTW, IPV4 address space is subjet to trading - http://tradeipv4.com/

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