



MARKET DATA ANALYSIS USING ALICE

Creating Alerts



Creating Alerts



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Creating Alerts



In this lecture

- Creation of Alerts
- Three different approaches are covered



Time

- 35 Minutes



Requirements

- Session 6



The *alert* command

Syntax:

`alert <code>, "<shorttext>", "<fulltext>"`

- `<code>` a number representing the alert code
- `<shorttext>` a brief description of the alert
- `<fulltext>` a description of the alert

```
1 declare Security_Traded[security]: boolean
2 {
3   on trade
4     if undefined(Security_Traded[security]) then
5       Security_Traded[security] = true
6       alert 999, "TEST ALERT", "TEST ALERT: Security [security] has just had its first trade of the day"
7     end if
8   end on
9 }
```

Example of an Alert



Exercise 1 – Run an Alert

Calibration Run

```
1 declare Security_Traded[security] : boolean
2 {
3   on trade
4   if undefined(Security_Traded[security]) then
5     Security_Traded[security] = true
6     alert 999, "TEST ALERT", "TEST ALERT: Security [security] has just had its first trade of the day"
7   end if
8 }
9 end on
```

Run Options:

- Select the run options indicated
- Set one day for your Run Dates

Run Options:

☒ Run to Almas for this run?

☒ View run messages for this run?

Calibration Options:

Calibration Run Name: test1

Alice File to Run: C:\Documents and Settings\Sh... Browse

Max number of Alerts: 99999

Run for Dates: 29/6/2007 29/6/2007 Set Dates



Output to ALMAS

Almas 9.10.2007 demo 29/6/2007

File Edit View Windows Help

Date: 29/6/2007 Security View All View Mine ALERTS: 0013/0013 DONE 00 SUS: 13

ID	UID	Mkt	Start Date	Date	Time	Start Time	End Time	Sec	Und	I	User	Last	FX	Plat	Extz	Field	Short Text	Code	Trader	RI	RIS	Long
1	demo	demo	29/6/2007	29/6/2007	9:15:53	9:15:53	9:57:54	MIC	MIC	100	-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security MIC has
2	demo	demo	29/6/2007	29/6/2007	9:07:06	9:07:06	9:57:54	ICO	ICO	100	-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security ICO has
3	demo	demo	29/6/2007	29/6/2007	9:37:01	9:37:01	9:57:54	IFI	IFI	100	-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security IFI has
4	demo	demo	29/6/2007	29/6/2007	10:00:10	10:00:10	9:57:54	CIC	CIC	100	-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security CIC has
5	demo	demo	29/6/2007	29/6/2007	10:00:10	10:00:10	9:57:54	VIS	VIS	100	-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security VIS has
6	demo	demo	29/6/2007	29/6/2007	10:02:26	10:02:26	9:57:54	WPP	WPP	100	-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security WPP has
7	demo	demo	29/6/2007	29/6/2007	10:04:10	10:04:10	9:57:54	FFB	FFB	100	-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security FFB has
8	demo	demo	29/6/2007	29/6/2007							-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security CR has
9	demo	demo	29/6/2007	29/6/2007							-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security HAD has
10	demo	demo	29/6/2007	29/6/2007							-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security SLC has
11	demo	demo	29/6/2007	29/6/2007							-	-	-	-	-	-	TEST ALERT: 999	-	NO	0	-	TEST ALERT: Security VLR has

Row Name

1	WestPort Pacific Inc	demo	1	1	NO	0	-	100	0.0000	0.0000
2	Victoria Communications	demo	1	1	NO	0	-	100	0.0000	0.0000
3	Chen Peta Inc	demo	1	1	NO	0	-	100	0.0000	0.0000
4	FFB Corp Inc	demo	1	1	NO	0	-	100	0.0000	0.0000
5	Colwell Corp Inc	demo	1	1	NO	0	-	100	0.0000	0.0000
6	Swall Corp Co Inc	demo	1	1	NO	0	-	100	0.0000	0.0000
7	WLR Interactive Inc	demo	1	1	NO	0	-	100	0.0000	0.0000
8	SecureLine Corporation	demo	1	1	NO	0	-	100	0.0000	0.0000
9	National Home Bancorporation	demo	1	1	NO	0	-	100	0.0000	0.0000
10	Micron Pharmaceuticals	demo	1	1	NO	0	-	100	0.0000	0.0000
11	Industri Financial Intl Corp	demo	1	1	NO	0	-	100	0.0000	0.0000

Live mode vs Off-line mode

Live mode. The alert notifications run in real time

Off line mode. Alert scripts run against existing market data in a single batch.

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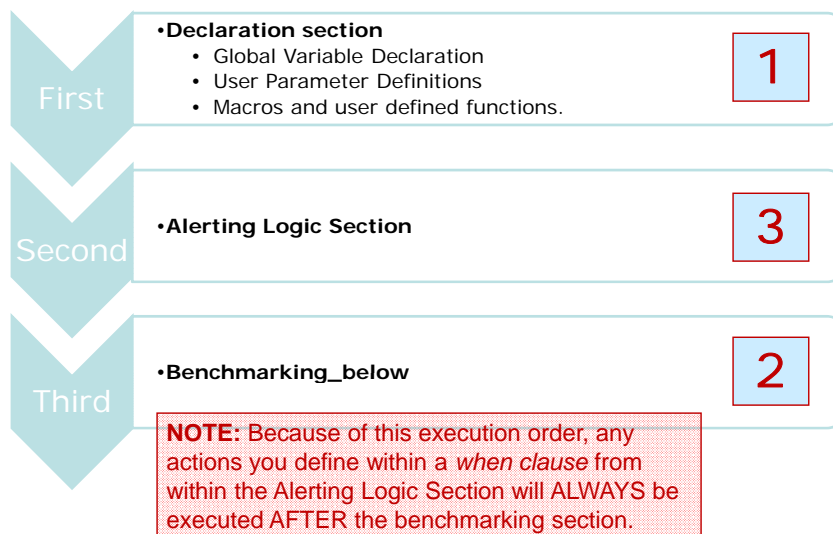
Surveillance Alerts

- Detect Abnormal Market Behavior
- Consist of
 - Suspicious Market Behavior
 - Thresholds
 - When suspicious market behavior breaches thresholds, alert triggers
- First example
 - Trade to Trade Price Change Alert



Alert Program Structure

Execution order



Alert Program Structure

```

1 userparams
2   PRICECHGTHRESHOLD: "The Price Change Threshold for Trade To Trade Alert": 5%;
3   BENCHMARK_PERIOD: "Number of days for historical benchmark": 30;
4   NUMBEROFSTDEV: "Number of standard deviations away from mean": 3;
5 end userparams

6 declare Trade2Trade_PChg_Distribution[security]: distribution
7 declare Trade2Trade_PChg_Threshold[security]: percent
8
9 {
10  on trade
11    declare let pchg = change(price, lastprice)
12    declare let direction = format(pchg > 0%, "increase", "decrease")
13    if abs(pchg) > Trade2Trade_PChg_Threshold[security] then
14      alert 101, "T2T PCHG": "Trade to Trade Price Change Alert: Security [security] has just been
15        traded at [price] while the previous trade price was [lastprice].
16        This is [abs(pchg)] [direction] which exceeds the
17        [Trade2Trade_PChg_Threshold[security]] threshold."
18      intensity = (abs(pchg) - Trade2Trade_PChg_Threshold[security]) / abs(pchg) * 100;
19      reissue = "101S+10"
20    end if
21  end on
22
23  B Benchmarks_below: BENCHMARK_PERIOD trdays
24  {
25    on trade
26      declare let pchg = abs(change(price, lastprice))
27      if defined(pchg) then
28        Trade2Trade_PChg_Distribution[security] <- pchg
29      end if
30    end on
31  }
32  at end
33  per security
34    if defined(Trade2Trade_PChg_Distribution[security]) then
35      declare let mean = distaverage(Trade2Trade_PChg_Distribution[security])
36      declare let stdev = diststdev(Trade2Trade_PChg_Distribution[security])
37      Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
38    end if
39  end per
40 end at

```

Declaration Section

Alerting Logic Section

Benchmarking Section



Trade to trade (T2T) price change alert

- 'T2T' Purpose
 - Trigger an alert when the current trade price is more than X% of the previous trade price
 - Trade 1: Price \$56.87 Volume: x10000
 - Trade 2: Price \$57.33 Volume: x5000
 - Trade 3: Price \$57.65 Volume: x20000
 - Trade 4: Price \$50.12 Volume: x50000





Trade to trade (T2T) price change alert

- 'T2T' Purpose
 - Trigger an alert when the current trade price is more than X% of the previous trade price
 - Trade 1: Price \$56.87 Volume: x10000
 - Trade 2: Price \$57.33 Volume: x5000
 - Trade 3: Price \$57.65 Volume: x20000
 - Trade 4: Price \$50.12 Volume: x50000



Trade to trade (T2T) price change alert

- Purpose
 - Trigger an alert when the current trade price is more than X% of the previous trade price
- We need to think about:
 - How do we define X% (the *threshold*)?
 - Which 'when clause' will trigger the alert?
 - What will be the alert code?
 - What alert text will be displayed?
 - How often will the alert be triggered (the *intensity* of the alert)?



Trade to trade (T2T) price change alert

Two types of thresholds

- **Static approach** (eg User Defined Parameters)
- Historical benchmarking approaches

```
{ userparams  
> PRICECHGTHRESHOLD: "The Price Change Threshold for Trade To Trade Alert" : 5%;  
} end userparams
```

SYNTAX for USERPARAMS

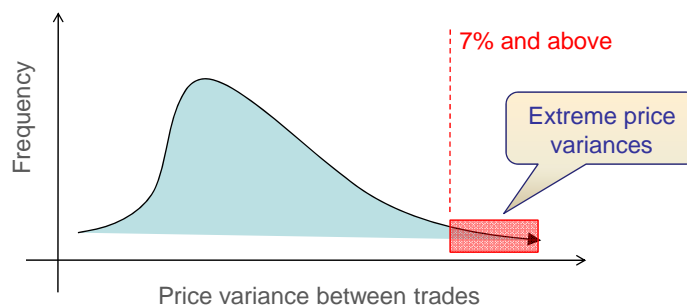
[userparam name] : "[userparam description]" : userparam value



Trade to trade (T2T) price change alert

Two types of thresholds

- Static approach (eg User Defined Parameters)
- **Historical benchmarking approaches**



```

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23   on trade
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28   } end on

29 at end
30 per security
31   if defined(Trade2Trade_PChg_Distribution[security]) then
32     declare let mean = distaverage(Trade2Trade_PChg_Distribution[security])
33     declare let stdev = diststdev(Trade2Trade_PChg_Distribution[security])
34     Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
35   end if
36 end per
37 end at

```

Declaration Section

Benchmarking Section

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```

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35   end if
36 end per
37 end at

```

Benchmarking section
Opens up a dataset
containing a large volume of
historical trading data which
we can use to create our
calculated benchmarks.

Benchmarking Section

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```

1 userparams
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37       declare let stdev = diststdev(Trade2Trade_PChg_Distribution[security])
38       Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
39     end if
40   end per
41 end at

```

SLIDE 17

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```

1 userparams
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38       Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
39     end if
40   end per
41 end at

```

Distribution array:
Stores a list of values rather than a single value for each security

30 days (as defined above).

Use trading days rather than calendar days.

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```

1 userparams
2   PRICECHGTHRESHOLD : "The Price Change Threshold for Trade To Trade Alert" : 5%;
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8 {
9   on trade
10     declare let pchg = change(price, lastprice)
11     declare let direction = format(pchg > 0%, "increase", "decrease")
12     if abs(pchg) > Trade2Trade_PChg_Threshold[security] then
13       alert 101, "T2T PCHG", "Trade to Trade Price Change Alert: Security [security] has just been
14         traded at [price] while the previous trade price was [lastprice].
15         This is [abs(pchg)] [direction] which exceeds the
16         [Trade2Trade_PChg_Threshold[security]] threshold."
17       intensity = (abs(pchg) - Trade2Trade_PChg_Threshold[security]) / abs(pchg) * 100,
18       reissue = "101S+10"
19     end if
20   end on
21 }

22 B Benchmarks_below: BENCHMARK_PERIOD trdays
23 {
24   on trade
25     declare let pchg = abs(change(price, lastprice))
26     if defined(pchg) then
27       Trade2Trade_PChg_Distribution[security] <- pchg
28     end if
29   end on
30 }
31 {
32   at end
33   per security
34     if defined(Trade2Trade_PChg_Distribution[security]) then
35       declare let mean = distaverage(Trade2Trade_PChg_Distribution[security])
36       declare let stdev = diststdev(Trade2Trade_PChg_Distribution[security])
37       Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
38     end if
39   end per
40 }
41 end at

```



```

B Benchmarks_below: BENCHMARK_PERIOD trdays
{
  on trade
  declare let pchg = abs(change(price, lastprice))
  if defined(pchg) then
    Trade2Trade_PChg_Distribution[security] <- pchg
  end if
end on
}
{
  at end
  per security
    if defined(Trade2Trade_PChg_Distribution[security]) then
      declare let mean = distaverage(Trade2Trade_PChg_Distribution[security])
      declare let stdev = diststdev(Trade2Trade_PChg_Distribution[security])
      Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
    end if
  end per
}
end at

```



```

B Benchmarks_below: BENCHMARK_PERIOD trdays
{
  on trade
    declare let pchg = abs(change(price, lastprice))
    if defined(pchg) then
      Trade2Trade_PChg_Distribution[security] <- pchg
    end if
  end on
}
at end
per security
  if defined(Trade2Trade_PChg_Distribution[security]) then
    declare let mean = diststdev(Trade2Trade_PChg_Distribution[security])
    declare let stdev = diststdev(Trade2Trade_PChg_Distribution[security])
    Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
  end if
end per
end at

```

Distributions can be loaded with values in the following ways:

- a) **Trade2Trade_PChg_Distribution[^CVC] <- 5.7**
- b) **Trade2Trade_PChg_Distribution[security] <- pchg**

After loading up values, you end up with a distribution, such as: **3.25, 5.34, 6.72, 1.18, 2.88 ...**

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```

B Benchmarks_below: BENCHMARK_PERIOD trdays
{
  on trade
    declare let pchg = abs(change(price, lastprice))
    if defined(pchg) then
      Trade2Trade_PChg_Distribution[security] <- pchg
    end if
  end on
}
at end
per security
  if defined(Trade2Trade_PChg_Distribution[security]) then
    declare let mean = diststdev(Trade2Trade_PChg_Distribution[security])
    declare let stdev = diststdev(Trade2Trade_PChg_Distribution[security])
    Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
  end if
end per
end at

```

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Trade to trade (T2T) price change alert

- Historical Benchmark
 - Common approach
 - Benchmarks_below: [number of days/trading days]
 - Distributions
 - Useful Functions
 - lastprice, change, abs
 - distaverage(distribution), diststdev(distribution)
 - Why convert all observations to positive values?
 - To capture extreme price changes regardless of whether they are positive or negative
 - Things to Note:
 - Any actions defined under the Benchmarks_below statement will only be executed for the benchmark period (i.e., the number of days/trading days defined for benchmarking)



Trade to trade (T2T) price change alert

Three approaches to T2T alerts:

One static approach, and

Two historical benchmarking approaches:

- ➡ **Standard deviation approach** (already discussed)
- **Distribution cutoff approach** (next)

New ALICE function used for the distribution cutoff approach:

- Distcutoff([distribution], [percentage cutoff])
- eg
Distcutoff([Trade2Trade_PChg_Distribution[security]], 99%)



Exercise 2

- Please implement the Distribution Cutoff Benchmark Approach for the Trade To Trade Price Change Alert

```
{
  userparams
  1 PRICECHGTHRESHOLD : "The Price Change Threshold for Trade To Trade Alert" : 5%;
  1 BENCHMARK_PERIOD : "Number of days for historical benchmark" : 30;
  1 NUMBEROFSTDEV : "Number of standard deviations away from mean" : 3;
} end userparams

I declare Trade2Trade_PChg_Distribution[security] : distribution
I declare Trade2Trade_PChg_Threshold[security] : percent

B Benchmarks_below: BENCHMARK_PERIOD trdays

{
  on trade
  {
    declare let pchg = abs(change(price, lastprice))
    {
      if defined(pchg) then
      2 Trade2Trade_PChg_Distribution[security] <- pchg
      }
    end if
  }
  end on

  {
    at end
    {
      per security
      {
        if defined(Trade2Trade_PChg_Distribution[security]) then
        > Trade2Trade_PChg_Threshold[security] = 
        }
        end if
      }
    end per
  }
  end at
}
```

PAUSE THE SLIDESHOW HERE



Exercise 2

- Sample Solution

```
{
  userparams
  1 PRICECHGTHRESHOLD : "The Price Change Threshold for Trade To Trade Alert" : 5%;
  1 BENCHMARK_PERIOD : "Number of days for historical benchmark" : 30;
  1 NUMBEROFSTDEV : "Number of standard deviations away from mean" : 3;
} end userparams

I declare Trade2Trade_PChg_Distribution[security] : distribution
I declare Trade2Trade_PChg_Threshold[security] : percent

B Benchmarks_below: BENCHMARK_PERIOD trdays

{
  on trade
  {
    declare let pchg = abs(change(price, lastprice))
    {
      if defined(pchg) then
      2 Trade2Trade_PChg_Distribution[security] <- pchg
      }
    end if
  }
  end on

  {
    at end
    {
      per security
      {
        if defined(Trade2Trade_PChg_Distribution[security]) then
        > Trade2Trade_PChg_Threshold[security] = distcutoff(Trade2Trade_PChg_Distribution[security], 99%)*100%
        }
        end if
      }
    end per
  }
  end at
}
```





Trade to trade (T2T) price change alert

Exercise 3

Within which type of *When Clause* will the alert need to be triggered?

PAUSE THE SLIDESHOW HERE



Trade to trade (T2T) price change alert

- Solution for exercise 3
 - When clause to be used: **On trade**
- Other details:
 - Alert code: assume 101
 - Short Alert Text: T2T PCHG
 - Long Alert Text:

Trade to Trade Price Change Alert: Security [security] has just been traded at [price] while the previous trade price was [lastprice]. This is [pchg%] [increase/decrease] which exceeds the [threshold%] threshold.



Exercise 4

- Giving the following details
 - Alert code: assume 101
 - Short Alert Text: T2T PCHG
 - Long Alert Text:
Trade to Trade Price Change Alert: Security [security]
has just been traded at [price] while the previous trade
price was [lastprice]. This is [pchg%]
[increase/decrease] which exceeds the [threshold%]
threshold.
- Please complete the Trade to Trade Price Change Alert by
using the Static User Parameter PRICECHGTHRESHOLD
as the threshold.

```
{ userparams
1  PRICECHGTHRESHOLD : "The Price Change Threshold for Trade To Trade Alert" : 5%;
```

PAUSE THE SLIDESHOW HERE



Exercise 4 - Sample solution for Static Approach

```
{ userparams
1  PRICECHGTHRESHOLD : "The Price Change Threshold for Trade To Trade Alert" : 5%;
1  BENCHMARK_PERIOD : "Number of days for historical benchmark" : 30;
1  NUMBEROFSTDEV : "Number of standard deviations away from mean" : 3;
} end userparams

{ on trade
  declare let pchg = change(price, lastprice)
  declare let direction = format(pchg > 0%, "increase", "decrease")
  if abs(pchg) > PRICECHGTHRESHOLD then
    alert 101, "T2T PCHG", "Trade to Trade Price Change Alert: Security [security] has
    just been traded at [price] while the previous trade price
    was [lastprice]. This is [abs(pchg)] [direction] which
    exceeds the [PRICECHGTHRESHOLD] threshold."
  end if
} end on
```

- Useful function
format(condition, [str1], [str2])




```

userparams
1  PRICECHGTHRESHOLD : "The Price Change Threshold for Trade To Trade Alert" : 5%;
1  BENCHMARK_PERIOD : "Number of days for historical benchmark" : 30;
1  NUMBEROFSTDEV : "Number of standard deviations away from mean" : 3;
end userparams

declare Trade2Trade_PChg_Distribution[security] : distribution
declare Trade2Trade_PChg_Threshold[security] : percent

on trade
  declare let pchg = change(price, lastprice)
  declare let direction = format(pchg > 0%, "increase", "decrease")
  if abs(pchg) > Trade2Trade_PChg_Threshold[security] then
    alert 101, "T2T PCHG", "Trade to Trade Price Change Alert: Security [security] has just been
    traded at [price] while the previous trade price was [lastprice].
    This is [abs(pchg)] [direction] which exceeds the
    [Trade2Trade_PChg_Threshold[security]] threshold."
    intensity = (abs(pchg) - Trade2Trade_PChg_Threshold[security]) / abs(pchg) * 100;
    reissue = "101S+10"
  end if
end on

B Benchmarks_below: BENCHMARK_PERIOD trdays

on trade
  declare let pchg = abs(change(price, lastprice))
  if defined(pchg) then
    Trade2Trade_PChg_Distribution[security] <- pchg
  end if
end on

at end
  per security
  if defined(Trade2Trade_PChg_Distribution[security]) then
    declare let mean = distaverage(Trade2Trade_PChg_Distribution[security])
    declare let stdev = diststdev(Trade2Trade_PChg_Distribution[security])
    Trade2Trade_PChg_Threshold[security] = (mean + NUMBEROFSTDEV*stdev)*100%
  end if
end per
end at

```

Intensity & reissue

How often should an alert be triggered?

For example:

- An alert was triggered for security CVC at 9:00 am this morning when the security had a 10% T2T price change.
- When the security has another T2T price change of 10%, should another alert be triggered?
- When should the alert be retriggered, and how many times?

Intensity

- ➡ "The intensity of an alert is a number, ranging from 0 to 100, which estimates the *significance* of an alert"

Syntax

intensity = <a number from 0 to 100>

Things to remember

- The intensity (normally a formula) results in a value between 0 and 100
- ➡ Intensity is calculated on each potential alert incidence
- ➡ A *high value* rates the Alert as one of high significance



Intensity

```
{ on trade
  declare let pchg = change(price, lastprice)
  declare let direction = format(pchg > 0%, "increase", "decrease")
  if abs(pchg) > Trade2Trade_PChg_Threshold[security] then
    alert 101, "T2T PCHG", "Trade to Trade Price Change Alert: Security [security] has just been
    traded at [price] while the previous trade price was [lastprice].
    This is [abs(pchg)] [direction] which exceeds the
    [Trade2Trade_PChg_Threshold[security]].threshold."
    intensity = (abs(pchg) - Trade2Trade_PChg_Threshold[security]) / abs(pchg) * 100.
    reissue = "101S+10"
  end if
} end on
```



Reissue

- Suppresses redundant alerts
- Uses *intensity* to decide if subsequent alerts need reissuing after the first instance of an alert
- By default: the reissue mechanism looks at any previous alert of the same alert code on the same security, and only reissues an alert if the intensity has increased by 10 or more.
- The example reissue rule(below) of "101S+10" does exactly this, but can be left out.

```
{
  A      if abs(pchg) > Trade2Trade_PChg_Threshold[security] then
  A      alert 101, "T2T PCHG", "Trade to Trade Price Change Alert: Security [security] has just
  A      traded at [price] while the previous trade price was [lastprice]
  A      This is [abs(pchg)] [direction] which exceeds the
  A      [Trade2Trade_PChg_Threshold[security]] threshold."
  A      intensity = (abs(pchg) - Trade2Trade_PChg_Threshold[security]) / abs(pchg) * 100,
  2      reissue = "101S+10"
  }
end if
```



Key terms and concepts

- Alerts
- Userparams
- Historical Benchmarks
- Standard Deviation Approach
- Distribution Cutoff Approach
- Reissue
- Intensity





Help is available

- Review this lecture
- Consult wikipedia, Alice Reference manual
- Post a question to the class forum