

# **Indxx Capital**

## **Eod index calculation process**

## Document history

S.No	Version	Date	Author	Remarks
1.	0.1	15 <sup>th</sup> Jan 2015	Amit Mahajan	Based on MS1 code
2.	1.0	22 <sup>nd</sup> Jan 2015	Amit Mahajan	Final draft

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## Installation notes

- ***“./files/input”*** directory will be used to fetch and read BBG data files. This should be an FTP location where BBG will push various data files.
- ***“./files/logs”*** directory will be used for log files generation. Log files will be generated using the following naming convention:
  - closing\_process\_logs\_<date>\_<time>
  - ca\_process\_logs\_<date>\_<time>
  - opening\_process\_logs\_<date>\_<time>
- ***“./files/output”*** directory will be used for output files generation. All the files, pre/post/output, will be generated in this directory.
- ***“./files/db-backup”*** directory will be used for database backups. Database backup will be taken before the closing process starts every day.

## How to trigger EoD calculation processes

### **From EoD tool front end**

- Login into the EoD tool and go to “User actions” tab.
- Choose the date for which you want to run the process and click on the respective run button.

### **From IIS auto scheduler**

Open the web browser (chrome/firefox) and enter the following URLs for various processes:

- *Corporate action process*  
`http://localhost/eod/multicurrency2/read_input_ca.php`
- *Closing file generation process*  
`http://localhost/eod/multicurrency2/read_input_files.php`
- *Opening file generation process*  
`http://localhost/eod/ica2/index.php?module=calcindxxopening`

### **Restore DB in-case of failure (system or manual)**

- Login into the EoD tool and go to “Restore DB” tab.
- Provide the DB name that needs to be restored and click run.

***P.S: Server and all processes will follow EST.***

## Database table summary

S.No.	Table	Summary
1	tbl_adj_benchmark_index	
2	tbl_admin	
3	tbl_assign_index	
4	tbl_assign_index_temp	
5	tbl_assign_index_temp2	
6	tbl_benchmark_index	
7	tbl_ca	List of CAs for various securities for live and upcoming indexes.
8	tbl_calendarzone	
9	tbl_cash_index	List of various live Cash indexes.
10	tbl_cash_index_temp	List of various upcoming Cash indexes.
11	tbl_cash_indxx_value	Everyday value of live cash indexes.
12	tbl_cash_indxx_value_temp	Everyday value of upcoming cash indexes.
13	tbl_cash_prices	List of prices of T-Bills.
14	tbl_ca_action_events	
15	tbl_ca_action_event_type	
16	tbl_ca_action_fields	List of CA events for various securities for live and upcoming indexes.
17	tbl_ca_action_fields_values	
18	tbl_ca_admin_approve	
19	tbl_ca_admin_approve_temp	
20	tbl_ca_admin_notified	
21	tbl_ca_category	List of CA categories supported by BBG.
22	tbl_ca_client	List of clients for EoD indexes.
23	tbl_ca_client_notified	
24	tbl_ca_dissapprove	
25	tbl_ca_inactive_req	
26	tbl_ca_indxx	
27	tbl_ca_plain_txt	
29	tbl_ca_subcategory	List of CA sub-categories supported by BBG.
30	tbl_ca_todo	
31	tbl_ca_user	
32	tbl_ca_user_login_time	
33	tbl_ca_values	
34	tbl_ca_values_user	
35	tbl_ca_values_user_edited	
36	tbl_ca_values_user_edited_temp	
37	tbl_client_index	
38	tbl_commodity_final_price	

39	tbl_commodity_final_price_temp	
40	tbl_commodity_index_temp_values	
41	tbl_commodity_index_values	
42	tbl_commodity_index_values_temp	
43	tbl_commodity_indxx	
44	tbl_commodity_indxx_temp	
45	tbl_commodity_indxx_ticker	
46	tbl_commodity_indxx_ticker_temp	
47	tbl_commodity_price	
48	tbl_commodity_ticker	
49	tbl_csi_adj_factor	User defined adjustment factor for various Complex Strategy indexes.
50	tbl_currency	
51	tbl_curr_prices	Currency factor data from BBG.
52	tbl_database_users	
53	tbl_db_user_login_time	
54	tbl_delist_runnindex_req	List of live indexes with security delisting action pending.
55	tbl_delist_runnsecurity	List of live securities to be delisted.
56	tbl_delist_tempindex_req	List of upcoming indexes with security delisting action pending.
57	tbl_delist_tempsecurity	List of upcoming securities to be delisted.
58	tbl_dividend_ph	
59	tbl_dividend_ph_req	
60	tbl_dividend_ph_req_temp	
61	tbl_dividend_ph_temp	
62	tbl_final_price	Price of securities, after currency conversion, for securities covered under live indexes.
63	tbl_final_price_temp	Price of securities, after currency conversion, for securities covered under upcoming indexes.
64	tbl_holidays	List of holidays for various index zones.
65	tbl_ignore_index	List of CA actions to be ignored for various live indexes.
66	tbl_ignore_index_temp	List of CA actions to be ignored for various upcoming indexes.
67	tbl_index_description	
68	tbl_index_types	
69	tbl_indxx	List of live indexes.
70	tbl_indxx_cs	List of complex strategy indexes and clients.
71	tbl_indxx_cs_value	Everyday value of complex strategy indexes.
72	tbl_indxx_log	Log of actions taken on live indexes.
73	tbl_indxx_lsc	List of Long Short Cash indexes and clients.
74	tbl_indxx_lsc_value	Everyday value of long short cash indexes.

75	tbl_indxx_sl	List of short long indexes and clients.
76	tbl_indxx_sl_value	Everyday values of short long indexes.
77	tbl_indxx_temp	List of upcoming indexes.
78	tbl_indxx_temp2	
79	tbl_indxx_temp_log	Log of actions taken on upcoming indexes.
80	tbl_indxx_ticker	List of securities covered in live indexes.
81	tbl_indxx_ticker_temp	List of securities covered in upcoming indexes.
82	tbl_indxx_ticker_temp2	
83	tbl_indxx_value	Everyday closing values of live indexes.
84	tbl_indxx_value_open	Everyday opening values of live indexes.
85	tbl_indxx_value_open_temp	Everyday opening values of upcoming indexes.
86	tbl_indxx_value_temp	Everyday closing values of upcoming indexes.
87	tbl_issue_request	
88	tbl_issue_request_comment	
89	tbl_it_users	
90	tbl_labor_prices	Libor prices from BBG.
91	tbl_lsc_adj_factor	User defined adjustment factor for Long Short Cash indexes.
92	tbl_prices_local_curr	BBG defined local currency prices of various securities used in live and upcoming indexes.
93	tbl_prices_local_curr_2	
94	tbl_prices_local_curr_chkmail	
95	tbl_project_task	
96	tbl_project_task_progress	
97	tbl_replace_runnindex_req	List of live indexes with security replacement request pending.
98	tbl_replace_runnsecurity	List of live securities with pending replacement.
99	tbl_replace_tempindex_req	List of upcoming indexes with security replacement request pending.
100	tbl_replace_tempsecurity	List of upcoming securities with pending replacement.
101	tbl_runnsecurities_replaced	
102	tbl_share	Shares of securities covered under live indexes.
103	tbl_share_temp	Shares of securities covered under upcoming indexes.
104	tbl_sl_adj_factor	User defined adjustment factor for Short Long indexes.
105	tbl_spin_stock_add	
106	tbl_spin_stock_add_securities	
107	tbl_spin_stock_add_securities_temp	
108	tbl_system_progress	
109	tbl_tempsecurities_replaced	
110	tbl_update_request	
111	tbl_update_request_comment	



112	tbl_user_ca_adj_factor	
113	tbl_user_types	
114	tbl_weights	

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## Closing file generation process

1. Enable error reporting for all PHP errors, warnings and info signals. Also register own error handler to capture PHP errors in log file.
2. Set maximum execution time for process completion:
  - 3600 seconds
3. Set maximum memory available to the process:
  - 1024 MB
4. Define and prepare log file for capturing closing file process traces:
  - ./files/logs/closing-process-logs.<date><time>
5. Define the address to which all error and info emails will be sent:
  - <email\_id>
6. Define the paths for input files for today's closing file generation process:
  - ./files/input/cashindex.csv.<date>
  - ./files/input/curr1.csv.<date>
  - ./files/input/libr.csv.<date>
  - ./files/input/multicurr.csv.<date>

*All input files must be generated from BBG without any headers.*
7. Take database backup at:
  - ./files/db-backup/admin\_icaic<date>-<time>.sql
8. Read currency factor file:
  - Log error and send email if:
    - File not available.
    - File empty.
  - Load currency factor file data in "tbl\_curr\_prices" table.
9. Read libor rate file:
  - Log error and send email if:
    - File not available.
    - File empty.
  - Load libor rate file data in "tbl\_libor\_prices" table.
10. Read cash index file:
  - Log error and send email if: 33d5cP3w
    - File not available.
    - File empty.
  - Load cash index file data in "tbl\_cash\_prices" table.

11. Read security price file:
  - Log error and send email if:
    - File not available.
    - File empty.
  - Load security prices file data in “tbl\_prices\_local\_curr” table.
12. Convert security prices to index specified currencies, using currency factor file data, for live indexes.
13. Convert security prices to index specified currencies, using currency factor file data, for upcoming indexes.
14. Convert security prices to index specified currencies, using currency factor file data, for live indexes with “hedged” property set to 1.
15. Convert security prices to index specified currencies, using currency factor file data, for upcoming indexes with “hedged” property set to 1.
16. Calculate and generate CSV closing file for live indexes with status=1, submitted=1, usersignoff=1 and dbsignoff=1.
  - Only process index for which it's not a holiday today.
  - Calculate index value based on latest security prices.
  - Generate warning in-case index value fluctuates more than 5%.
  - Update latest index value in DB.
  - Generate closing files for each live index.
17. Calculate and generate CSV closing file for upcoming indexes with status=1, submitted=1, usersignoff=1 and dbsignoff=1.
  - Only process index for which it's not a holiday today.
  - Calculate index value based on latest security prices.
  - Generate warning in-case index value fluctuates more than 5%.
  - Update latest index value in DB.
  - Generate closing files for each upcoming index.
18. Calculate and generate composite CSV closing files for clients.
  - For each client generate a consolidated list of closing index values for all subscribed indexes by each client.
19. Calculate and generate CSV files for live cash indexes.
  - Only process index for which it's not a holiday today.
  - Calculate new value of live cash index based on previous value of cash index and last 2 days values of component T-Bills.
  - Update DB with new index value.
  - Generate index value files for various live cash indexes.
20. Calculate and generate CSV files for upcoming cash indexes.

- Only process index for which it's not a holiday today.
  - Calculate new value of upcoming cash index based on previous value of cash index and last 2 days values of component T-Bills.
  - Update DB with new index value.
  - Generate index value files for various upcoming cash indexes.
21. Calculate and generate CSV files for "Long Short Cash" indexes with status=1.
- Only process index for which it's not a holiday today.
  - Calculate new value of LSC index based on previous value of LSC index, adjusted values of various component long, short and cash indexes.
  - Update DB with new index value.
  - Generate LSC index value files for various live LSC indexes.
22. Calculate and generate CSV files for "Complex Strategy" indexes with status=1.
- Only process index for which it's not a holiday today.
  - Calculate new value of CSI index based on previous value of SL index and adjusted values of various component indexes.
  - Update DB with new index value.
  - Generate CSI index value files for various live CSI indexes.
23. Calculate and generate CSV files for "Short Long" indexes with status=1.
- Only process index for which it's not a holiday today.
  - Calculate new value of SL index based on previous value of SL index, adjusted values of various component indexes and the Libor rate.
  - Update DB with new index value.
  - Generate SL index value files for various live SL indexes.
24. Generate excel sheet for "Complex Strategy" indexes.
- Generate XLS files for various complex strategy indexes for various clients.
25. FTP closing files to client accessible locations. [DISABLED CURRENTLY]
- Copy opening files at the FTP server, accessible to clients.
  - Send emails to users in-case of failure.

## Corporate action process

1. Enable error reporting for all PHP errors, warnings and info signals. Also register own error handler to capture PHP errors in log file.
2. Set maximum execution time for process completion:
  - 3600 seconds
3. Set maximum memory available to the process:
  - 1024 MB
4. Define and prepare log file for capturing closing file process traces:
  - ./files/logs/ca-process-logs.<date><time>
5. Define the address to which all error and info emails will be sent:
  - <email\_id>
6. Define the paths for input files for today's closing file generation process:
  - ./files/input/ca\_test.csv.<date>

*All input files must be generated from BBG without any headers.*
7. Delete actions from "tbl\_ca\_plain\_txt".
8. Read corporate action file:
  - Log error and send email if:
    - File not available.
    - File empty.
  - Load raw corporate actions in "tbl\_ca\_plain\_txt" table.
9. Delete actions from "tbl\_ca" and "tbl\_ca\_values".
10. For each CA row in "tbl\_ca\_plain\_txt" fill corporate action in "tbl\_ca" and action fields in "tbl\_ca\_values".
11. For live indexes with DVD\_CASH CA, check if security and dividend currencies mentioned in CA are same as what is configured in EoD system. If not, disable the index and send email to staff.
12. For upcoming indexes with DVD\_CASH CA, check if security and dividend currencies mentioned in CA are same as what is configured in EoD system. If not, disable the index and send email to staff.
13. Generate email notifications for ticker change CAs.
14. Generate miscellaneous notifications.
15. Process delist CA for upcoming indexes.
  - Fetch list of indexes with delisting request pending for today.
  - Fetch the list of securities that needs to be delisted.
  - Delete the securities and re-calculate old and new divisors for the index.

- Update divisor values in DB.
- Replace delisted securities with replacement securities.
- Re-calculate index parameters.

16. Process delist CA for live indexes.

- Fetch list of indexes with delisting request pending for today.
- Fetch the list of securities that needs to be delisted.
- Delete the securities and re-calculate old and new divisors for the index.
- Update divisor values in DB.
- Replace delisted securities with replacement securities.
- Re-calculate index parameters.

17. Publish CA files for clients.

- For each live index with status=1, submitted=1, usersignoff=1 and dbsignoff=1.
- Fetch the list of securities for each index.
- Fetch the list of CAs to be applied to indexes for today.
- Generate CA file for each index.

18. Send an email to users mentioning the values of various corporate actions raised on various securities that will be effective from today.

19. Spinstockaddtemp

20. Spinstockadd

21. calccadp

22. calccadptemp

23. calcrebalance [TO BE DISCUSSED]

24. Update old and new divisor values for live indexes.

- Fetch list of all live indexes with ireturn=2.
- Only process the index for which it's not a holiday today.
- Pull the last index value and dividend market share for "today – 1month".
- Calculate new divisor value.
- Update old divisor and new divisor parameters of the index with newly calculated divisor value.

25. Make upcoming index live.

- Fetch list of all upcoming indexes, with today as the live date, from upcoming cash index list.
- Put the index parameters and its value into the live index list.
- Delete the index from upcoming cash index list.

26. Make upcoming cash index live.

- Fetch list of all upcoming cash indexes, with today as the live date, from upcoming cash index list.

- Put the index parameters and its value into the live cash index list.
- Delete the index from upcoming cash index list.

27. FTP CA files to client accessible locations. [DISABLED CURRENTLY]

- Copy CA files at the FTP server, accessible to clients.
- Send emails to users in-case of failure.

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## Opening file generation process

1. Enable error reporting for all PHP errors, warnings and info signals. Also register own error handler to capture PHP errors in log file.
2. Set maximum execution time for process completion:
  - 3600 seconds
3. Set maximum memory available to the process:
  - 1024 MB
4. Define and prepare log file for capturing closing file process traces:
  - ./files/logs/opening-process-logs.<date><time>
5. Define the address to which all error and info emails will be sent:
  - <email\_id>
6. Calculate and generate CSV files for live indexes with status=1, submitted=1, usersignoff=1, dbsignoff=1.
  - Only process index for which it's not a holiday today.
  - Apply corporate actions raised on each security. Following corporate actions are incorporated:
    - User CA adjustment factor
    - STOCK\_SPLIT
    - DVD\_STOCK
    - SPIN
    - RIGHTS\_OFFER
    - DVD\_CASH
    - CHG\_ID
    - CHG\_NAME
  - Generate opening files for various live indexes.
7. Calculate and generate CSV files for upcoming indexes with status=1, submitted=1, usersignoff=1, dbsignoff=1.
  - Only process index for which it's not a holiday today.
  - Apply corporate actions raised on each security. Following corporate actions are incorporated:
    - User CA adjustment factor
    - STOCK\_SPLIT
    - DVD\_STOCK
    - SPIN
    - RIGHTS\_OFFER
    - DVD\_CASH
    - CHG\_ID
    - CHG\_NAME
  - Generate opening files for various upcoming indexes.
8. Send CA file date change notification emails to users. [DISABLED CURRENTLY]



- On Monday, send emails to users to update corporate action date range on BBG service.

9. FTP opening files to client accessible locations. [DISABLED CURRENTLY]

- Copy opening files at the FTP server, accessible to clients.
- Send emails to users in-case of failure.

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## Appendix 1 – Development tools and environment setup

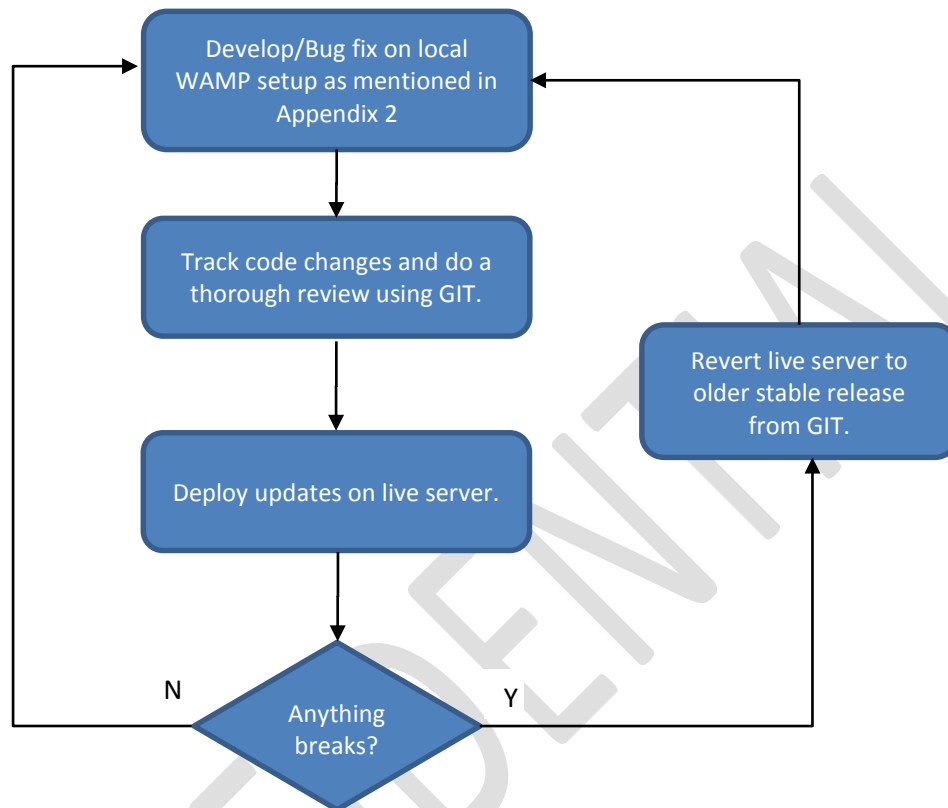
### Tools needed

- Source code management – Git GUI (Opensource)
- Source code editor – Eclipse for PHP (Opensource)
- Local hosting server and DB – WAMP (Opensource)
- File comparison tool – Beyond Compare (Opensource)

### Development setup

- Hosting and DB
  - Install WAMP.
  - Go to Myphp admin of WAMP and create a new user with username “admin\_ica2” and password “Reset1105@”.
  - Create a new DB with name “admin\_ica2”.
  - Import live DB (in non-compressed), from production setup, in the above created DB.
- Source code
  - Download the source code from Github using Git GUI.
  - Copy the source code in WAMP directory – “C://wamp/www/”
  - EoD now can be accessed in browser by typing following URL – “localhost/eod/ica2/index.php”.
- Development
  - Unzip downloaded Eclipse folder.
  - Create a new PHP project.
  - Link source code, from C://wamp/www/eod, into this project.

## Appendix 2 – Development and Quality assurance process



### Key points:

- All development and testing must happen on development setup. All configuration can be switched between development and production setup by flipping the “DEBUG” flag in ‘functions.class.php’ and ‘input\_files.php’ files.
- All the changes done in either development or production setup must be tracked in Github. One commit per change.
- A separate production branch must be maintained in Github. This branch will contain stable production code running at any given point of time. Further, ‘write’ access to this branch must be given only to the PM.
- All changes going in the production branch must be reviewed thoroughly.