Data Analysis: Aviation Accident Data Sets

Note: The **IO-AVSTATS** database used here contains NTSB aircraft accident data as of January 1, 2023.

This report is about comparing the NTSB Census of US Civil Aviation Accidents and the **IO-AVSTATS** database for consistency.

The NTSB provides U.S. aviation accident data in Microsoft Acces format on its website at the following link. There are three file types to distinguish:

- **Pre2008**: contains the data from 1982 to 2008 with some older data,
- **avall**: contains the data since 2008
- **upDDMON**: contains update data on the 1st, 8th, 15th and 22nd of each month.

IO-Aero migrated the data from MS Access files **Pre2008** and **avall** to a PostgreSQL database on November 5, 2022, and has been processing new update files **upDDMON** since that time.

```
file_name |first_processed       |last_processed        |counter|
----------+----------------------+----------------------+-------+
Pre2008   |2022-11-05 10:44:38.868|2022-11-05 11:49:12.766|     2|
avall     |2022-11-05 11:59:49.223|2022-11-05 20:31:00.556|     2|
up01NOV   |2022-12-12 11:57:31.862|                       |     1|
up08NOV   |2022-12-12 12:05:13.850|                       |     1|
up15NOV   |2022-12-12 12:07:16.557|                       |     1|
up22NOV   |2022-11-27 13:40:18.094|2022-12-12 12:08:15.915|     2|
up01DEC   |2022-12-12 13:26:03.872|                       |     1|
up08DEC   |2022-12-12 13:29:14.703|                       |     1|
up15DEC   |2022-12-18 03:03:24.994|                       |     1|
up22DEC   |2022-12-23 02:41:07.220|                       |     1|
up01JAN   |2023-01-02 22:19:57.376|                       |     1|
```

This process is based on the assumption that by processing the two files **Pre2008** and **avall** once and regularly processing all update files since then, the NTSB data and the IO-Aero data match. Unfortunately, this is not the case.

1. Cross check of the number of stored rows

A comparison of the current versions of the two files **Pre2008** and **avall** with the **IO-AVSTATS** database gives the following picture:

Database Table	Number of rows as of January 1, 2023			
	Pre2008	avall	IO-AVSTATS	Difference
aircraft	63'913	25'448	89'399	−38
dt_aircraft	487'123	211'020	698'422	−279
dt_events	254'360	84'875	339'414	−179
dt_flight_crew	366'463	142'895	509'365	−7
engines	63'874	23'220	87'096	−2
events	63'001	25'053	88'091	−37
events_sequence	16	54'812	54'894	−66
findings	10	59'658	59'668	0
flight_crew	66'047	25'673	91'721	−1
flight_time	887'597	320'177	1'207'785	−11
injury	350'758	74'810	425'804	−236
narratives	63'912	24'170	88'084	−2
ntsb_admin	63'001	25'055	88'093	−37
occurrences	137'989	0	137'989	0
seq_of_events	264'329	0	264'329	0

From this, one can clearly conclude that the NTSB is making data deletions without reflecting this in the update files.

2. Consistency check of MS Access file `avall`

One should expect as a result of loading the NTSB files `Pre2008`, `avall` and all subsequent update files that the data in the current NTSB file `avall` and the `IO-AVSTATS` database match. This can be easily checked by reloading the current NTSB file `avall` into the `IO-AVSTATS` database. This is possible because in the `IO-AVSTATS` database a change is only made in a row if one of the columns has changed.

However, from the following log it is unfortunately evident that 3 changes in the NTSB database table `events` are not included in the change files.

```
Progress update 2023-01-08 10:54:57.926471 :
=================================================================================.
Progress update 2023-01-08 10:54:57.926471 : INFO.00.004 Start Launcher.
Progress update 2023-01-08 10:54:57.928471 : INFO.00.001 The logger is configured
and ready.
Progress update 2023-01-08 10:54:57.936971 : INFO.00.008 Arguments task='l_n_a'
msaccess='avall'.
Progress update 2023-01-08 10:54:57.936971 : ------------------------------------
--------------------------------------------.
Progress update 2023-01-08 10:54:57.936971 : INFO.00.049 Loading NTSB MS Access
database data from file 'avall'.
Progress update 2023-01-08 10:54:57.937472 : ------------------------------------
---------------------------------------
Progress update 2023-01-08 10:54:57.937472 : INFO.00.054 ODBC driver='DRIVER=
{Microsoft Access Driver (*.mdb, *.accdb)};DBQ=D:\SoftDevelopment\Projects\IO-
Aero\io-avstats\data\download\avall.mdb;'.
Progress update 2023-01-08 10:54:58.124971 : INFO.00.021 The following database
table is not processed: 'MSysAccessObjects'.
Progress update 2023-01-08 10:54:58.125472 : INFO.00.021 The following database
```

```
table is not processed: 'MSysACEs'.
Progress update 2023-01-08 10:54:58.125472 : INFO.00.021 The following database
table is not processed: 'MSysIMEXColumns'.
Progress update 2023-01-08 10:54:58.125472 : INFO.00.021 The following database
table is not processed: 'MSysIMEXSpecs'.
Progress update 2023-01-08 10:54:58.125472 : INFO.00.021 The following database
table is not processed: 'MSysModules2'.
Progress update 2023-01-08 10:54:58.125472 : INFO.00.021 The following database
table is not processed: 'MSysNavPaneGroupCategories'.
Progress update 2023-01-08 10:54:58.125472 : INFO.00.021 The following database
table is not processed: 'MSysNavPaneGroups'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'MSysNavPaneGroupToObjects'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'MSysNavPaneObjectIDs'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'MSysObjects'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'MSysQueries'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'MSysRelationships'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'Country'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'ct_iaids'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'ct_seqevt'.
Progress update 2023-01-08 10:54:58.125972 : INFO.00.021 The following database
table is not processed: 'eADMSPUB_DataDictionary'.
Progress update 2023-01-08 10:54:58.126472 : INFO.00.021 The following database
table is not processed: 'states'.
Progress update 2023-01-08 10:54:58.126472 :
Progress update 2023-01-08 10:54:58.126472 : Database table       : events
<----------------------------------.
Progress update 2023-01-08 10:55:05.520972 : Number of rows so far read :   5000.
Progress update 2023-01-08 10:55:12.226010 : Number of rows so far read :  10000.
Progress update 2023-01-08 10:55:18.856471 : Number of rows so far read :  15000.
Progress update 2023-01-08 10:55:25.430471 : Number of rows so far read :  20000.
Progress update 2023-01-08 10:55:32.083403 : Number of rows so far read :  25000.
Progress update 2023-01-08 10:55:32.152403 : Number rows selected :  25053.
Progress update 2023-01-08 10:55:32.152403 : Number rows updated   :       3.
Progress update 2023-01-08 10:55:32.171903 :
Progress update 2023-01-08 10:55:32.171903 : Database table        : aircraft
<----------------------------------.
Progress update 2023-01-08 10:59:44.049422 : Number of rows so far read :   5000.
Progress update 2023-01-08 11:03:55.709177 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:08:07.079556 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:12:18.158872 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:16:29.489073 : Number of rows so far read :  25000.
Progress update 2023-01-08 11:16:51.969021 : Number rows selected :  25448.
Progress update 2023-01-08 11:16:51.992520 :
Progress update 2023-01-08 11:16:51.992520 : Database table        : dt_events
<----------------------------------.
Progress update 2023-01-08 11:16:56.112522 : Number of rows so far read :   5000.
```

```
Progress update 2023-01-08 11:17:00.062021 : Number of rows so far read :   10000.
Progress update 2023-01-08 11:17:04.009521 : Number of rows so far read :   15000.
Progress update 2023-01-08 11:17:07.971827 : Number of rows so far read :   20000.
Progress update 2023-01-08 11:17:11.947351 : Number of rows so far read :   25000.
Progress update 2023-01-08 11:17:15.920851 : Number of rows so far read :   30000.
Progress update 2023-01-08 11:17:19.910351 : Number of rows so far read :   35000.
Progress update 2023-01-08 11:17:23.956872 : Number of rows so far read :   40000.
Progress update 2023-01-08 11:17:28.006459 : Number of rows so far read :   45000.
Progress update 2023-01-08 11:17:31.985360 : Number of rows so far read :   50000.
Progress update 2023-01-08 11:17:36.006304 : Number of rows so far read :   55000.
Progress update 2023-01-08 11:17:40.029105 : Number of rows so far read :   60000.
Progress update 2023-01-08 11:17:44.082605 : Number of rows so far read :   65000.
Progress update 2023-01-08 11:17:48.120527 : Number of rows so far read :   70000.
Progress update 2023-01-08 11:17:52.097052 : Number of rows so far read :   75000.
Progress update 2023-01-08 11:17:56.148091 : Number of rows so far read :   80000.
Progress update 2023-01-08 11:18:00.158587 : Number rows selected :   84875.
Progress update 2023-01-08 11:18:00.167086 :
Progress update 2023-01-08 11:18:00.167086 : Database table      : ntsb_admin
   <----------------------------------.
Progress update 2023-01-08 11:18:04.299087 : Number of rows so far read :    5000.
Progress update 2023-01-08 11:18:08.354587 : Number of rows so far read :   10000.
Progress update 2023-01-08 11:18:12.397087 : Number of rows so far read :   15000.
Progress update 2023-01-08 11:18:16.441587 : Number of rows so far read :   20000.
Progress update 2023-01-08 11:18:20.477758 : Number of rows so far read :   25000.
Progress update 2023-01-08 11:18:20.526759 : Number rows selected :   25055.
Progress update 2023-01-08 11:18:20.528759 :
Progress update 2023-01-08 11:18:20.528759 : Database table      : dt_aircraft
   <----------------------------------.
Progress update 2023-01-08 11:18:25.120259 : Number of rows so far read :    5000.
Progress update 2023-01-08 11:18:29.163736 : Number of rows so far read :   10000.
Progress update 2023-01-08 11:18:33.278735 : Number of rows so far read :   15000.
Progress update 2023-01-08 11:18:37.303235 : Number of rows so far read :   20000.
Progress update 2023-01-08 11:18:41.307235 : Number of rows so far read :   25000.
Progress update 2023-01-08 11:18:45.302735 : Number of rows so far read :   30000.
Progress update 2023-01-08 11:18:49.414235 : Number of rows so far read :   35000.
Progress update 2023-01-08 11:18:53.486735 : Number of rows so far read :   40000.
Progress update 2023-01-08 11:18:57.497234 : Number of rows so far read :   45000.
Progress update 2023-01-08 11:19:01.475167 : Number of rows so far read :   50000.
Progress update 2023-01-08 11:19:05.450167 : Number of rows so far read :   55000.
Progress update 2023-01-08 11:19:09.479167 : Number of rows so far read :   60000.
Progress update 2023-01-08 11:19:13.533167 : Number of rows so far read :   65000.
Progress update 2023-01-08 11:19:17.643945 : Number of rows so far read :   70000.
Progress update 2023-01-08 11:19:21.688945 : Number of rows so far read :   75000.
Progress update 2023-01-08 11:19:25.742069 : Number of rows so far read :   80000.
Progress update 2023-01-08 11:19:29.785071 : Number of rows so far read :   85000.
Progress update 2023-01-08 11:19:33.842569 : Number of rows so far read :   90000.
Progress update 2023-01-08 11:19:37.808569 : Number of rows so far read :   95000.
Progress update 2023-01-08 11:19:41.772069 : Number of rows so far read :  100000.
Progress update 2023-01-08 11:19:45.770178 : Number of rows so far read :  105000.
Progress update 2023-01-08 11:19:49.722678 : Number of rows so far read :  110000.
Progress update 2023-01-08 11:19:53.745178 : Number of rows so far read :  115000.
Progress update 2023-01-08 11:19:57.727178 : Number of rows so far read :  120000.
Progress update 2023-01-08 11:20:01.755178 : Number of rows so far read :  125000.
Progress update 2023-01-08 11:20:05.910679 : Number of rows so far read :  130000.
```

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Progress update 2023-01-08 11:20:09.945678 : Number of rows so far read : 135000.
Progress update 2023-01-08 11:20:13.965285 : Number of rows so far read : 140000.
Progress update 2023-01-08 11:20:17.994762 : Number of rows so far read : 145000.
Progress update 2023-01-08 11:20:21.985261 : Number of rows so far read : 150000.
Progress update 2023-01-08 11:20:26.051761 : Number of rows so far read : 155000.
Progress update 2023-01-08 11:20:30.140762 : Number of rows so far read : 160000.
Progress update 2023-01-08 11:20:34.184261 : Number of rows so far read : 165000.
Progress update 2023-01-08 11:20:38.170761 : Number of rows so far read : 170000.
Progress update 2023-01-08 11:20:42.181261 : Number of rows so far read : 175000.
Progress update 2023-01-08 11:20:46.199261 : Number of rows so far read : 180000.
Progress update 2023-01-08 11:20:50.216762 : Number of rows so far read : 185000.
Progress update 2023-01-08 11:20:54.232387 : Number of rows so far read : 190000.
Progress update 2023-01-08 11:20:58.254460 : Number of rows so far read : 195000.
Progress update 2023-01-08 11:21:02.275612 : Number of rows so far read : 200000.
Progress update 2023-01-08 11:21:06.309111 : Number of rows so far read : 205000.
Progress update 2023-01-08 11:21:10.315400 : Number of rows so far read : 210000.
Progress update 2023-01-08 11:21:11.126900 : Number rows selected : 211020.
Progress update 2023-01-08 11:21:11.149399 :
Progress update 2023-01-08 11:21:11.149399 : Database table      : engines
    <---------------------------------.
Progress update 2023-01-08 11:21:15.703845 : Number of rows so far read :  5000.
Progress update 2023-01-08 11:21:20.078960 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:21:24.511459 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:21:28.959459 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:21:31.813459 : Number rows selected :  23220.
Progress update 2023-01-08 11:21:31.819959 :
Progress update 2023-01-08 11:21:31.820459 : Database table      :
    events_sequence    <---------------------------------.
Progress update 2023-01-08 11:21:36.214959 : Number of rows so far read :  5000.
Progress update 2023-01-08 11:21:40.382959 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:21:44.580459 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:21:48.780298 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:21:52.972298 : Number of rows so far read :  25000.
Progress update 2023-01-08 11:21:57.171033 : Number of rows so far read :  30000.
Progress update 2023-01-08 11:22:01.358439 : Number of rows so far read :  35000.
Progress update 2023-01-08 11:22:05.542086 : Number of rows so far read :  40000.
Progress update 2023-01-08 11:22:09.698086 : Number of rows so far read :  45000.
Progress update 2023-01-08 11:22:13.884087 : Number of rows so far read :  50000.
Progress update 2023-01-08 11:22:17.898086 : Number rows selected :  54812.
Progress update 2023-01-08 11:22:17.906086 :
Progress update 2023-01-08 11:22:17.906086 : Database table      : findings
    <---------------------------------.
Progress update 2023-01-08 11:22:22.540089 : Number of rows so far read :  5000.
Progress update 2023-01-08 11:22:26.864086 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:22:31.184492 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:22:35.492492 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:22:39.780492 : Number of rows so far read :  25000.
Progress update 2023-01-08 11:22:44.130992 : Number of rows so far read :  30000.
Progress update 2023-01-08 11:22:48.454677 : Number of rows so far read :  35000.
Progress update 2023-01-08 11:22:52.789844 : Number of rows so far read :  40000.
Progress update 2023-01-08 11:22:57.120637 : Number of rows so far read :  45000.
Progress update 2023-01-08 11:23:01.419796 : Number of rows so far read :  50000.
Progress update 2023-01-08 11:23:05.766431 : Number of rows so far read :  55000.
Progress update 2023-01-08 11:23:09.791340 : Number rows selected :  59658.
```

```
Progress update 2023-01-08 11:23:09.805840 :
Progress update 2023-01-08 11:23:09.805840 : Database table       : flight_crew
<---------------------------------.
Progress update 2023-01-08 11:23:14.958784 : Number of rows so far read :   5000.
Progress update 2023-01-08 11:23:19.820268 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:23:24.729594 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:23:29.622084 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:23:34.540084 : Number of rows so far read :  25000.
Progress update 2023-01-08 11:23:35.199084 : Number rows selected :  25673.
Progress update 2023-01-08 11:23:35.208584 :
Progress update 2023-01-08 11:23:35.208584 : Database table       : injury
<---------------------------------.
Progress update 2023-01-08 11:23:39.735841 : Number of rows so far read :   5000.
Progress update 2023-01-08 11:23:43.896539 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:23:47.861665 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:23:51.935371 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:23:55.984372 : Number of rows so far read :  25000.
Progress update 2023-01-08 11:24:00.036871 : Number of rows so far read :  30000.
Progress update 2023-01-08 11:24:04.101597 : Number of rows so far read :  35000.
Progress update 2023-01-08 11:24:08.135097 : Number of rows so far read :  40000.
Progress update 2023-01-08 11:24:12.153455 : Number of rows so far read :  45000.
Progress update 2023-01-08 11:24:16.246138 : Number of rows so far read :  50000.
Progress update 2023-01-08 11:24:20.300638 : Number of rows so far read :  55000.
Progress update 2023-01-08 11:24:24.341138 : Number of rows so far read :  60000.
Progress update 2023-01-08 11:24:28.366638 : Number of rows so far read :  65000.
Progress update 2023-01-08 11:24:32.397569 : Number of rows so far read :  70000.
Progress update 2023-01-08 11:24:36.310164 : Number rows selected :  74810.
Progress update 2023-01-08 11:24:36.318164 :
Progress update 2023-01-08 11:24:36.318664 : Database table       : narratives
<---------------------------------.
Progress update 2023-01-08 11:25:06.658888 : Number of rows so far read :   5000.
Progress update 2023-01-08 11:25:38.351141 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:26:14.370031 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:26:41.030434 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:26:52.552326 : Number rows selected :  24170.
Progress update 2023-01-08 11:26:52.576323 :
Progress update 2023-01-08 11:26:52.576323 : Database table       : occurrences
<---------------------------------.
Progress update 2023-01-08 11:26:52.576824 : Number rows selected :       0.
Progress update 2023-01-08 11:26:52.576824 :
Progress update 2023-01-08 11:26:52.576824 : Database table       : dt_flight_crew
<---------------------------------.
Progress update 2023-01-08 11:26:57.021429 : Number of rows so far read :   5000.
Progress update 2023-01-08 11:27:01.116839 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:27:05.160588 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:27:09.299411 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:27:13.347448 : Number of rows so far read :  25000.
Progress update 2023-01-08 11:27:17.359906 : Number of rows so far read :  30000.
Progress update 2023-01-08 11:27:21.401896 : Number of rows so far read :  35000.
Progress update 2023-01-08 11:27:25.572195 : Number of rows so far read :  40000.
Progress update 2023-01-08 11:27:29.662676 : Number of rows so far read :  45000.
Progress update 2023-01-08 11:27:33.798273 : Number of rows so far read :  50000.
Progress update 2023-01-08 11:27:37.851519 : Number of rows so far read :  55000.
Progress update 2023-01-08 11:27:41.919623 : Number of rows so far read :  60000.
```

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Progress update 2023-01-08 11:27:46.008191 : Number of rows so far read :  65000.
Progress update 2023-01-08 11:27:50.072306 : Number of rows so far read :  70000.
Progress update 2023-01-08 11:27:54.155886 : Number of rows so far read :  75000.
Progress update 2023-01-08 11:27:58.186193 : Number of rows so far read :  80000.
Progress update 2023-01-08 11:28:02.246693 : Number of rows so far read :  85000.
Progress update 2023-01-08 11:28:06.272698 : Number of rows so far read :  90000.
Progress update 2023-01-08 11:28:10.298302 : Number of rows so far read :  95000.
Progress update 2023-01-08 11:28:14.333921 : Number of rows so far read : 100000.
Progress update 2023-01-08 11:28:18.352599 : Number of rows so far read : 105000.
Progress update 2023-01-08 11:28:22.371189 : Number of rows so far read : 110000.
Progress update 2023-01-08 11:28:26.522324 : Number of rows so far read : 115000.
Progress update 2023-01-08 11:28:30.583703 : Number of rows so far read : 120000.
Progress update 2023-01-08 11:28:34.645931 : Number of rows so far read : 125000.
Progress update 2023-01-08 11:28:38.709503 : Number of rows so far read : 130000.
Progress update 2023-01-08 11:28:42.754553 : Number of rows so far read : 135000.
Progress update 2023-01-08 11:28:46.829771 : Number of rows so far read : 140000.
Progress update 2023-01-08 11:28:49.203271 : Number rows selected : 142895.
Progress update 2023-01-08 11:28:49.217771 :
Progress update 2023-01-08 11:28:49.217771 : Database table      : flight_time
        <----------------------------------.
Progress update 2023-01-08 11:28:54.286174 : Number of rows so far read :   5000.
Progress update 2023-01-08 11:28:58.389961 : Number of rows so far read :  10000.
Progress update 2023-01-08 11:29:02.508078 : Number of rows so far read :  15000.
Progress update 2023-01-08 11:29:06.645259 : Number of rows so far read :  20000.
Progress update 2023-01-08 11:29:10.783724 : Number of rows so far read :  25000.
Progress update 2023-01-08 11:29:14.909806 : Number of rows so far read :  30000.
Progress update 2023-01-08 11:29:19.026191 : Number of rows so far read :  35000.
Progress update 2023-01-08 11:29:23.150194 : Number of rows so far read :  40000.
Progress update 2023-01-08 11:29:27.367274 : Number of rows so far read :  45000.
Progress update 2023-01-08 11:29:31.566274 : Number of rows so far read :  50000.
Progress update 2023-01-08 11:29:35.726611 : Number of rows so far read :  55000.
Progress update 2023-01-08 11:29:39.869869 : Number of rows so far read :  60000.
Progress update 2023-01-08 11:29:43.982202 : Number of rows so far read :  65000.
Progress update 2023-01-08 11:29:48.071534 : Number of rows so far read :  70000.
Progress update 2023-01-08 11:29:52.189364 : Number of rows so far read :  75000.
Progress update 2023-01-08 11:29:56.321801 : Number of rows so far read :  80000.
Progress update 2023-01-08 11:30:00.433774 : Number of rows so far read :  85000.
Progress update 2023-01-08 11:30:04.542272 : Number of rows so far read :  90000.
Progress update 2023-01-08 11:30:08.643190 : Number of rows so far read :  95000.
Progress update 2023-01-08 11:30:12.731690 : Number of rows so far read : 100000.
Progress update 2023-01-08 11:30:16.840690 : Number of rows so far read : 105000.
Progress update 2023-01-08 11:30:20.935190 : Number of rows so far read : 110000.
Progress update 2023-01-08 11:30:25.021998 : Number of rows so far read : 115000.
Progress update 2023-01-08 11:30:29.117324 : Number of rows so far read : 120000.
Progress update 2023-01-08 11:30:33.218599 : Number of rows so far read : 125000.
Progress update 2023-01-08 11:30:37.348908 : Number of rows so far read : 130000.
Progress update 2023-01-08 11:30:41.463377 : Number of rows so far read : 135000.
Progress update 2023-01-08 11:30:45.552042 : Number of rows so far read : 140000.
Progress update 2023-01-08 11:30:49.702545 : Number of rows so far read : 145000.
Progress update 2023-01-08 11:30:53.813622 : Number of rows so far read : 150000.
Progress update 2023-01-08 11:30:57.958047 : Number of rows so far read : 155000.
Progress update 2023-01-08 11:31:02.064574 : Number of rows so far read : 160000.
Progress update 2023-01-08 11:31:06.185597 : Number of rows so far read : 165000.
Progress update 2023-01-08 11:31:10.347399 : Number of rows so far read : 170000.
```

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Progress update 2023-01-08 11:31:14.460899 : Number of rows so far read : 175000.
Progress update 2023-01-08 11:31:18.566522 : Number of rows so far read : 180000.
Progress update 2023-01-08 11:31:22.656724 : Number of rows so far read : 185000.
Progress update 2023-01-08 11:31:26.759541 : Number of rows so far read : 190000.
Progress update 2023-01-08 11:31:30.850994 : Number of rows so far read : 195000.
Progress update 2023-01-08 11:31:34.977994 : Number of rows so far read : 200000.
Progress update 2023-01-08 11:31:39.104760 : Number of rows so far read : 205000.
Progress update 2023-01-08 11:31:43.224278 : Number of rows so far read : 210000.
Progress update 2023-01-08 11:31:47.343758 : Number of rows so far read : 215000.
Progress update 2023-01-08 11:31:51.473308 : Number of rows so far read : 220000.
Progress update 2023-01-08 11:31:55.610395 : Number of rows so far read : 225000.
Progress update 2023-01-08 11:31:59.722655 : Number of rows so far read : 230000.
Progress update 2023-01-08 11:32:03.829224 : Number of rows so far read : 235000.
Progress update 2023-01-08 11:32:07.926916 : Number of rows so far read : 240000.
Progress update 2023-01-08 11:32:12.021113 : Number of rows so far read : 245000.
Progress update 2023-01-08 11:32:16.121738 : Number of rows so far read : 250000.
Progress update 2023-01-08 11:32:20.230809 : Number of rows so far read : 255000.
Progress update 2023-01-08 11:32:24.428988 : Number of rows so far read : 260000.
Progress update 2023-01-08 11:32:28.552488 : Number of rows so far read : 265000.
Progress update 2023-01-08 11:32:32.683488 : Number of rows so far read : 270000.
Progress update 2023-01-08 11:32:36.809492 : Number of rows so far read : 275000.
Progress update 2023-01-08 11:32:40.943466 : Number of rows so far read : 280000.
Progress update 2023-01-08 11:32:45.062966 : Number of rows so far read : 285000.
Progress update 2023-01-08 11:32:49.188608 : Number of rows so far read : 290000.
Progress update 2023-01-08 11:32:53.319314 : Number of rows so far read : 295000.
Progress update 2023-01-08 11:32:57.395559 : Number of rows so far read : 300000.
Progress update 2023-01-08 11:33:01.511843 : Number of rows so far read : 305000.
Progress update 2023-01-08 11:33:05.647894 : Number of rows so far read : 310000.
Progress update 2023-01-08 11:33:09.775894 : Number of rows so far read : 315000.
Progress update 2023-01-08 11:33:13.911762 : Number of rows so far read : 320000.
Progress update 2023-01-08 11:33:14.060262 : Number rows selected : 320177.
Progress update 2023-01-08 11:33:14.105399 :
Progress update 2023-01-08 11:33:14.105399 : Database table       : seq_of_events
   <---------------------------------.
Progress update 2023-01-08 11:33:14.105899 : Number rows selected :      0.
Progress update 2023-01-08 11:33:14.205984 : INFO.00.065 Cleansing PostgreSQL
data.
Progress update 2023-01-08 11:33:14.206484 : -----------------------------------
-------------------------------------
Progress update 2023-01-08 11:33:14.248984 : INFO.00.066 Cleansing table
'aircraft' column 'acft_category'.
Progress update 2023-01-08 11:33:16.897611 : -----------------------------------
-------------------------------------
Progress update 2023-01-08 11:33:16.897611 : INFO.00.066 Cleansing table
'aircraft' column 'far_part'.
Progress update 2023-01-08 11:33:19.546798 : -----------------------------------
-------------------------------------
Progress update 2023-01-08 11:33:19.547298 : INFO.00.066 Cleansing table 'events'
column 'ev_city'.
Progress update 2023-01-08 11:33:20.870836 : Number cols trimmed  :      3.
Progress update 2023-01-08 11:33:22.121143 : -----------------------------------
-------------------------------------
Progress update 2023-01-08 11:33:22.121143 : INFO.00.066 Cleansing table 'events'
column 'ev_site_zipcode'.
```

```
Progress update 2023-01-08 11:33:24.665371 : -----------------------------------
------------------------------------------
Progress update 2023-01-08 11:33:24.665928 : INFO.00.066 Cleansing table 'events'
column 'latitude'.
Progress update 2023-01-08 11:33:27.213439 : -----------------------------------
------------------------------------------
Progress update 2023-01-08 11:33:27.213439 : INFO.00.066 Cleansing table 'events'
column 'longitude'.
Progress update 2023-01-08 11:33:29.755180 : -----------------------------------
-------------------------------------------.
Progress update 2023-01-08 11:33:29.755180 :    2,311,946,209,000 ns - Total time
launcher.
Progress update 2023-01-08 11:33:29.755180 : INFO.00.006 End   Launcher.
Progress update 2023-01-08 11:33:29.755679 :
================================================================================.
```

3. Conclusions

The following actions should address these issues:

1. A new column **last_seen** of format timestamp is added for all NTSB database tables stored in the **IO-AVSTATS** database.
2. The **avall** file is reloaded instead of the current update file at a rate to be defined. Thereby all rows of the NTSB file in the IO-AVSTATS database are provided with the same timestamp in the column **last_seen**. After loading the NTSB data, all rows since 2008 in the **IO-AVSTATS** database that do not contain this timestamp are deleted.
3. It is checked when loading the data that no data from before 2008 is affected.