AGO Station Monitoring

Environmental and Instrumentation Parameters in "Real-Time"

Iridium Direct-IP SBD Feed

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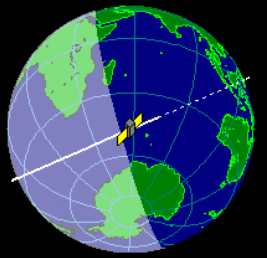
Why Direct-IP for Short Burst Data (SBD)?

Delivery Options:

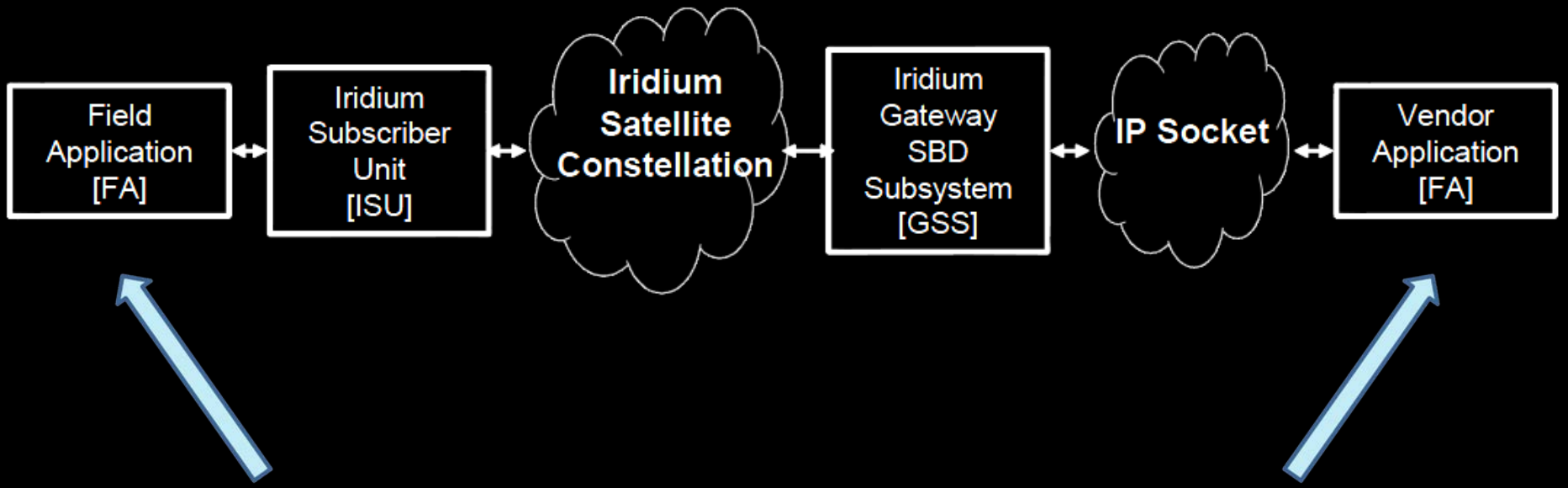
- **e-mail**
- **Direct-IP**

Advantages of Direct-IP:

- **Low latency**
- **Robust - confirmation, retry**
- **Internal checks - confidence**
- **Binary packet - no text parsing**



SBD Flow & Client Responsibility:



AGO application & Interface to sensors

Socket server application & handling received data

Implementing a Socket Server:

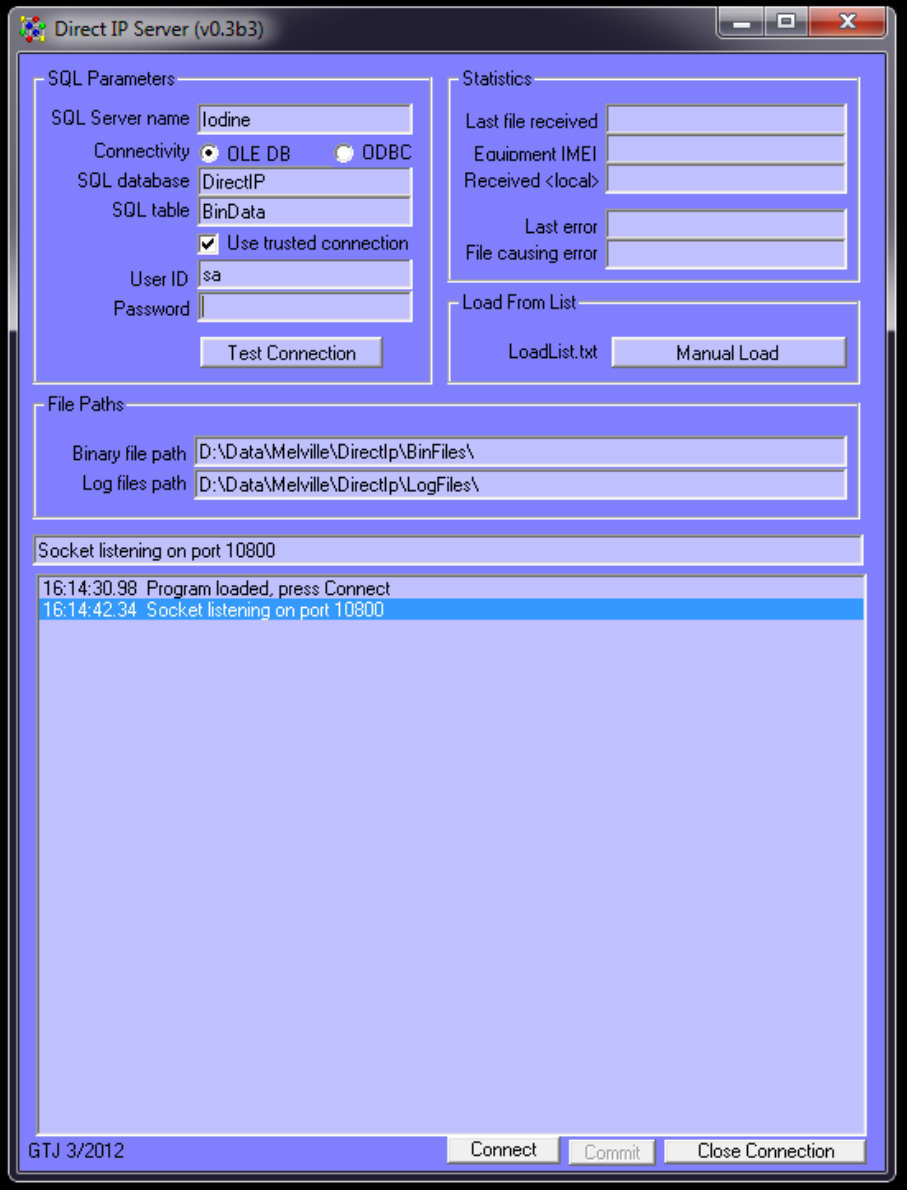
TCP/IP Communication:

- Receive SBD packet
- Verify packet integrity
- Send confirmation

Data Disposition:

- Write file to disk
- Write binary to SQL

***Very** low overhead . . .*



SQL Server is an Independent Process:

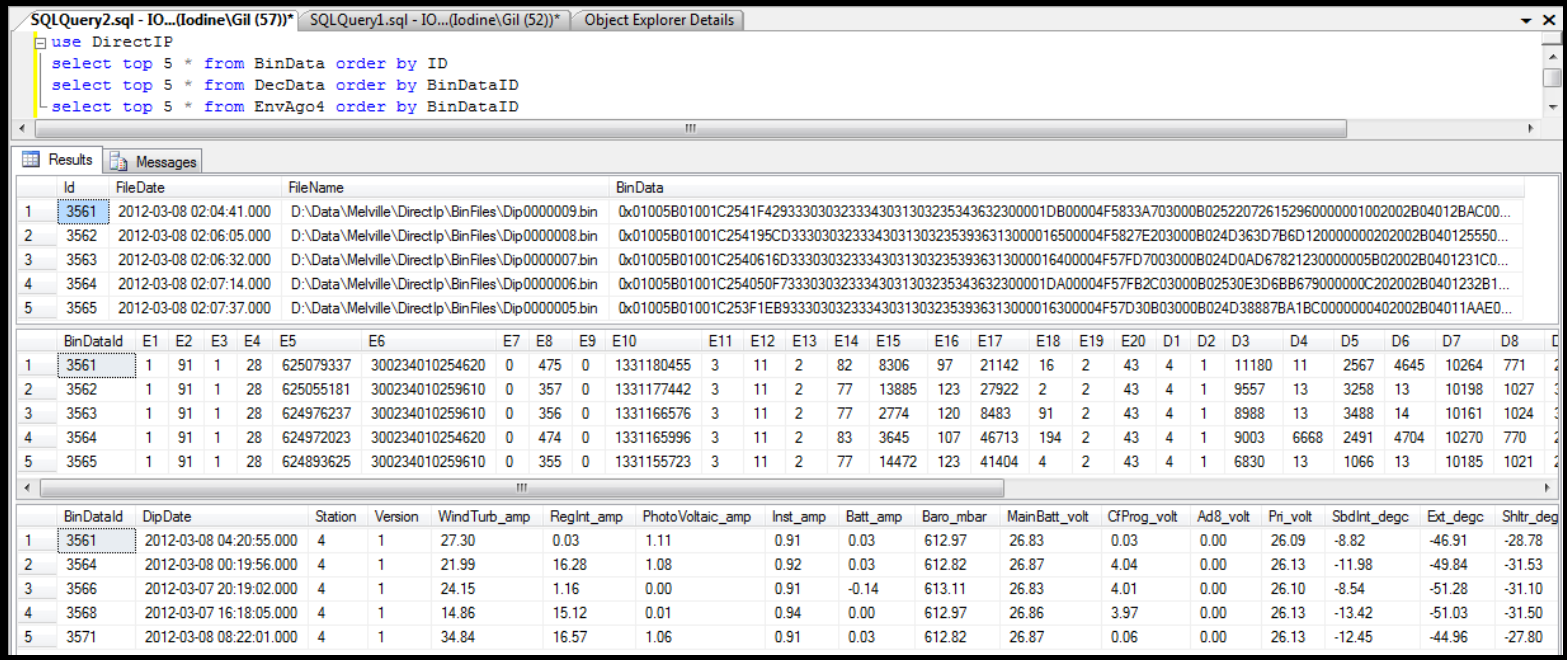
- Application inserts binary data, a SQL trigger is fired.
- Trigger code pull binary apart based on word size and inserts decoded numbers into decimal table.
- That triggers code to interpret the numbers as defined by the client, inserting these into the final tables.

SQL Tables:

BinData
Date from envelope, file , raw binary record

DecData
Binary decoded into envelope (defined) & raw client numbers

EnvAgo4 / 5
Interpreted values as defined by client.



SQLQuery2.sql - IO...(Iodine\Gil (57))* | SQLQuery1.sql - IO...(Iodine\Gil (52))* | Object Explorer Details

```
use DirectIP
select top 5 * from BinData order by ID
select top 5 * from DecData order by BinDataID
select top 5 * from EnvAgo4 order by BinDataID
```

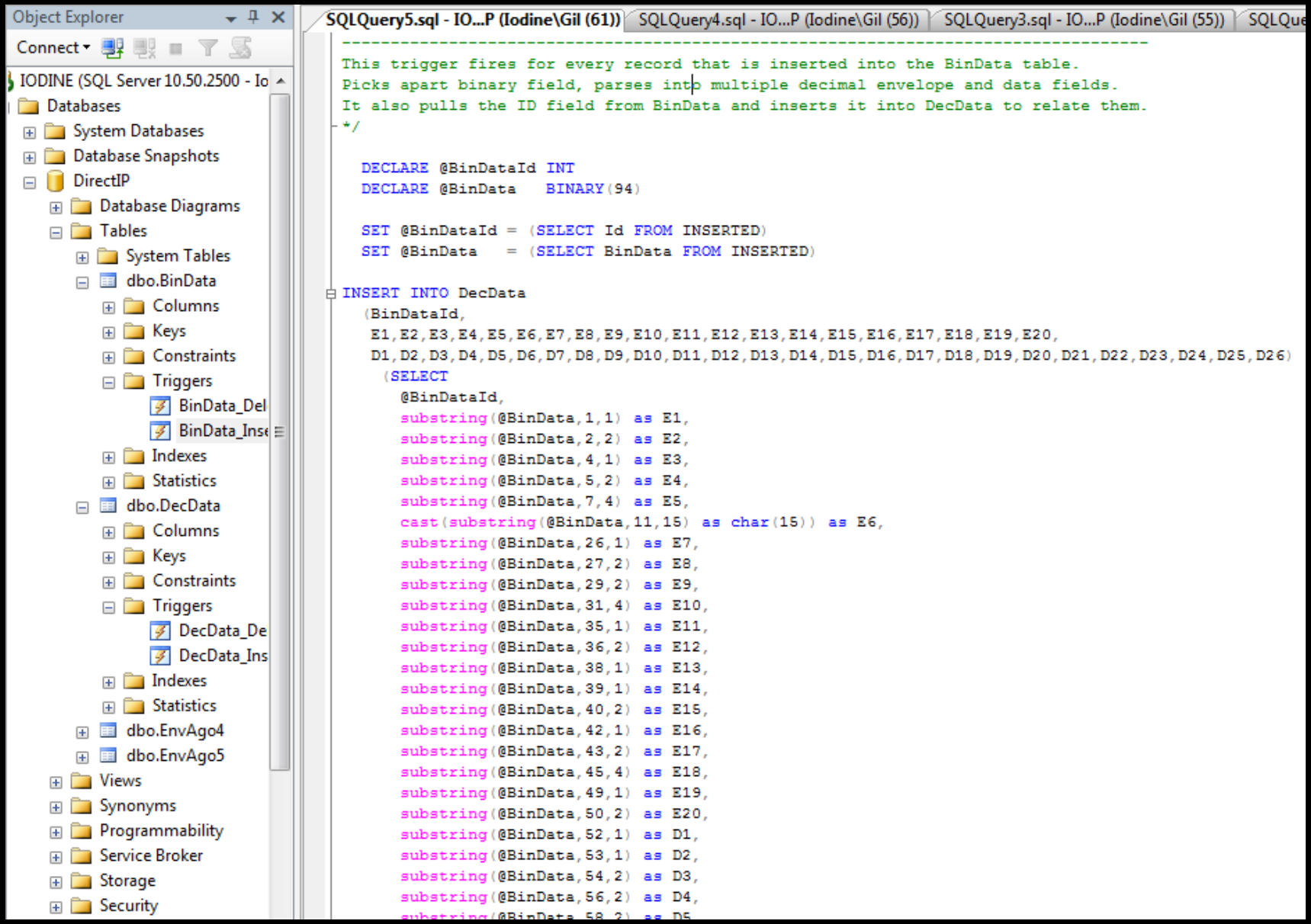
Results | Messages

	Id	FileDate	FileName	BinData
1	3561	2012-03-08 02:04:41.000	D:\Data\Melville\DirectIp\BinFiles\Dip0000009.bin	0x01005B01001C2541F42933303032333430313032353436323000001DB00004F5833A703000B025220726152960000001002002B04012BAC00...
2	3562	2012-03-08 02:06:05.000	D:\Data\Melville\DirectIp\BinFiles\Dip0000008.bin	0x01005B01001C254195CD33303032333430313032353936313000016500004F5827E203000B024D363D7B6D120000000202002B040125550...
3	3563	2012-03-08 02:06:32.000	D:\Data\Melville\DirectIp\BinFiles\Dip0000007.bin	0x01005B01001C2540616D33303032333430313032353936313000016400004F57FD7003000B024D0AD678212300000005B02002B0401231C0...
4	3564	2012-03-08 02:07:14.000	D:\Data\Melville\DirectIp\BinFiles\Dip0000006.bin	0x01005B01001C254050F73330303233343031303235343632300001DA00004F57FB2C03000B02530E3D6BB679000000C202002B0401232B1...
5	3565	2012-03-08 02:07:37.000	D:\Data\Melville\DirectIp\BinFiles\Dip0000005.bin	0x01005B01001C253F1EB93330303233343031303235393631300001630000 4F57D30B03000B024D38887BA1BC0000000402002B04011AAE0...

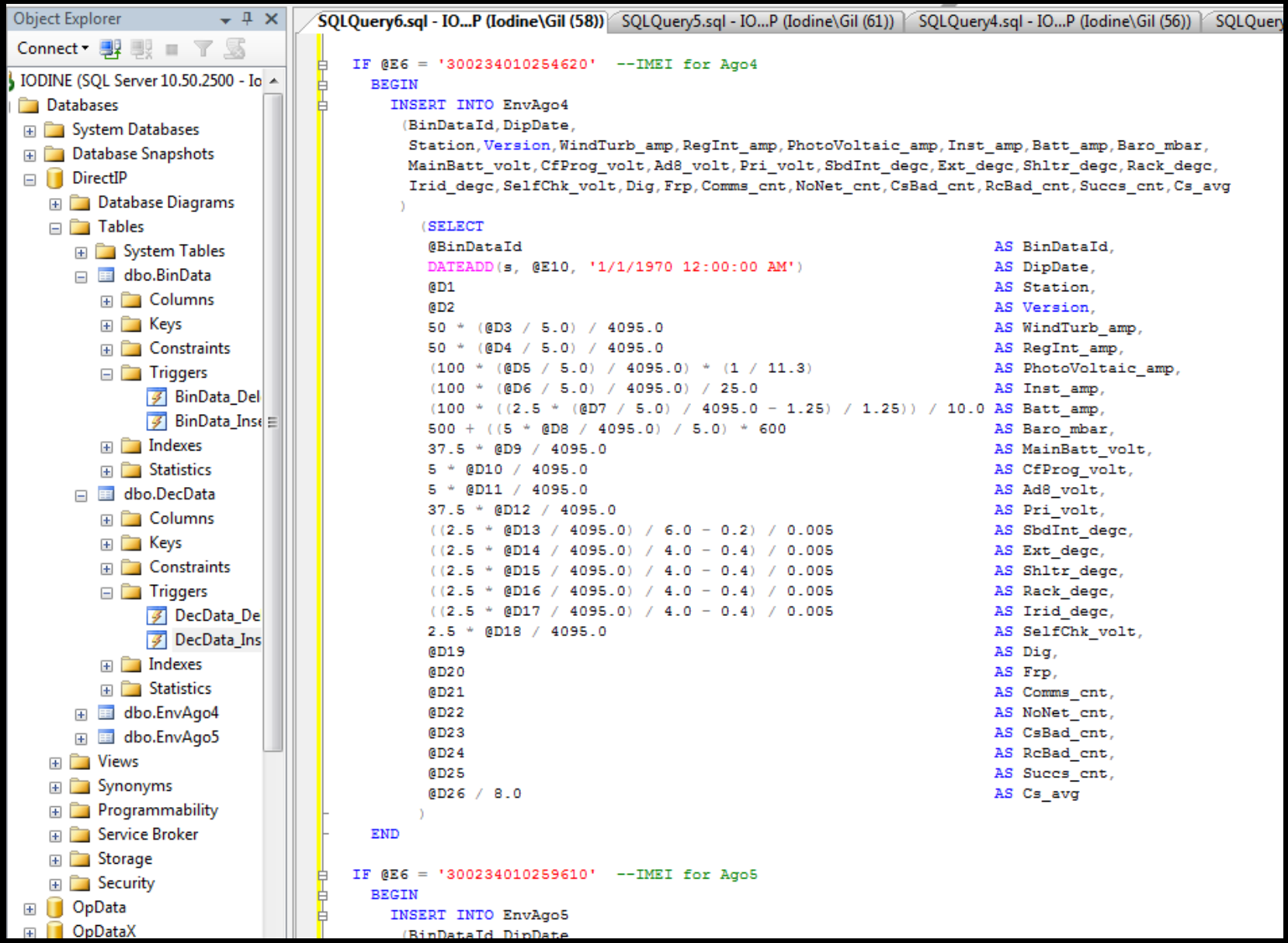
	BinDataId	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16	E17	E18	E19	E20	D1	D2	D3	D4	D5	D6	D7	D8
1	3561	1	91	1	28	625079337	300234010254620	0	475	0	1331180455	3	11	2	82	8306	97	21142	16	2	43	4	1	11180	11	2567	4645	10264	771
2	3562	1	91	1	28	625055181	300234010259610	0	357	0	1331177442	3	11	2	77	13885	123	27922	2	2	43	4	1	9557	13	3258	13	10198	1027
3	3563	1	91	1	28	624976237	300234010259610	0	356	0	1331166576	3	11	2	77	2774	120	8483	91	2	43	4	1	8988	13	3488	14	10161	1024
4	3564	1	91	1	28	624972023	300234010254620	0	474	0	1331165996	3	11	2	83	3645	107	46713	194	2	43	4	1	9003	6668	2491	4704	10270	770
5	3565	1	91	1	28	624893625	300234010259610	0	355	0	1331155723	3	11	2	77	14472	123	41404	4	2	43	4	1	6830	13	1066	13	10185	1021

	BinDataId	DipDate	Station	Version	WindTurb_amp	RegInt_amp	PhotoVoltaic_amp	Inst_amp	Batt_amp	Baro_mbar	MainBatt_volt	CfProg_volt	Ad8_volt	Pri_volt	SbdInt_degc	Ext_degc	Shltr_deg
1	3561	2012-03-08 04:20:55.000	4	1	27.30	0.03	1.11	0.91	0.03	612.97	26.83	0.03	0.00	26.09	-8.82	-46.91	-28.78
2	3564	2012-03-08 00:19:56.000	4	1	21.99	16.28	1.08	0.92	0.03	612.82	26.87	4.04	0.00	26.13	-11.98	-49.84	-31.53
3	3566	2012-03-07 20:19:02.000	4	1	24.15	1.16	0.00	0.91	-0.14	613.11	26.83	4.01	0.00	26.10	-8.54	-51.28	-31.10
4	3568	2012-03-07 16:18:05.000	4	1	14.86	15.12	0.01	0.94	0.00	612.97	26.86	3.97	0.00	26.13	-13.42	-51.03	-31.50
5	3571	2012-03-08 08:22:01.000	4	1	34.84	16.57	1.06	0.91	0.03	612.82	26.87	0.06	0.00	26.13	-12.45	-44.96	-27.80

Trigger on BinData insert: to DecData



Trigger on DecData insert: to EnvAgo#:



Why SQL, why multiple tables?

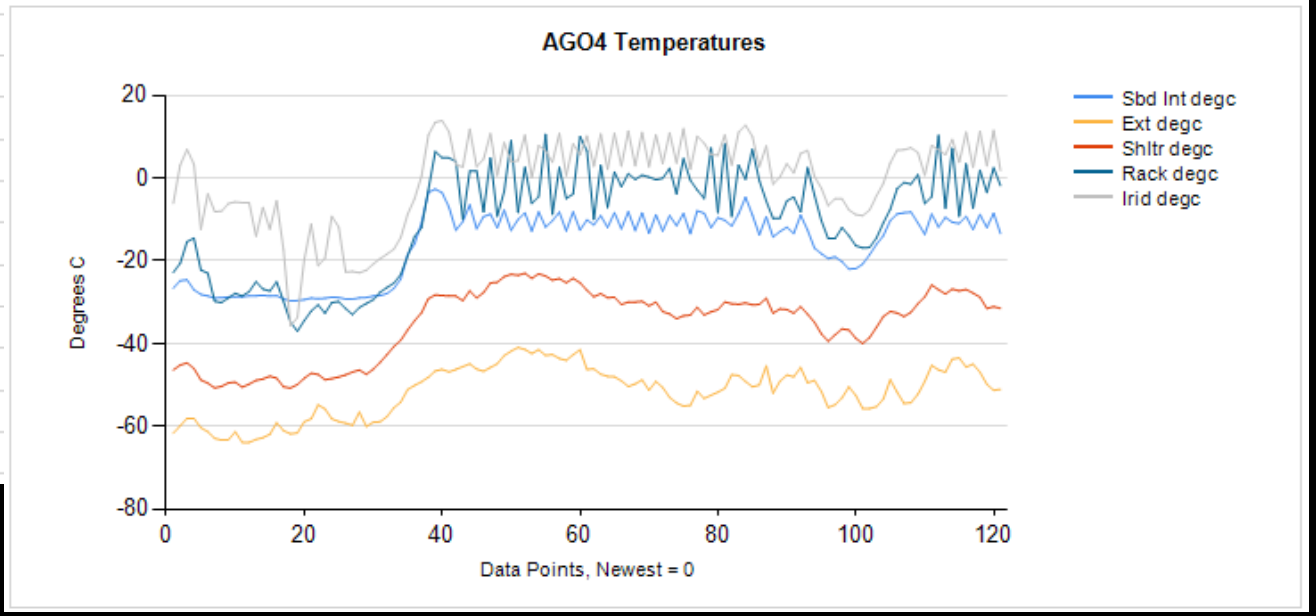
- **Socket Server application overhead minimized; The receive and write completed in milliseconds.**
- **Interpretation of data separated from receiver. SQL inherently multi-user, anyone can hit data.**
- **Auditing - ID field links all tables together, and reference them back to the originally received file.**
- **Standardized - maintained by IT department without the need for specific application training.**
- **SQL Reporting Services . . .**

SQL Reporting Services, Publishing:

- Develop dynamically updating reports, available locally, emailed, on intranet, or on the Internet.
- Supports drill-down, subscriptions, and fully interactive, ad-hoc reporting with user selections.

AGO4 Environment - Temp (deg C), Barometer (mbar)

Date Time	SBD Int.	External	Shelter	Rack	Iridium	Barometer
2012-03-30 06:37:04	-26.63	-61.65	-46.39	-22.83	-6.16	611.65
2012-03-30 02:36:10	-24.82	-59.91	-45.20	-20.66	3.09	611.06
2012-03-30 10:35:14	-24.60	-58.05	-44.65	-15.41	6.90	611.65
2012-03-30 06:34:11						
2012-03-30 02:33:09						
2012-03-29 10:32:14						
2012-03-29 06:31:16						
2012-03-29 02:30:21						
2012-03-29 10:29:20						
2012-03-29 06:28:14						
2012-03-29 02:27:11						
2012-03-28 10:26:14						
2012-03-28 06:25:10						
2012-03-28 02:24:05						



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