PAT BI Details

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Pen CS will be opening up the full capability of PAT CAT though a purpose built API.

Taking Your Population Health Reporting to the Next Level

The PAT BI database provides unprecedented access to the data derived and submitted from CAT4 to your PAT CAT. A purpose built granular database designed for use with Business Intelligence (BI) Tools such as Qlik, Power BI etc. empowers your PHN/ACCHO to explore the depth of data currently at your disposal. Practice data is stored at patient level with an encrypted unique patient identifier allowing for comprehensive longitudinal reporting.

KEY FEATURES

- Uninterrupted access to your data
- Granular patient level database structure
- Fully documented database schema
- Includes PAT CAT database cleaning tools and services
- Capacity for patient and practice longitudinal reporting
- If you are using the Pen CS Geocoding Service you will have the added advantage of bringing together your practices CAT4 clinical data with addi tional data sets using the exposed Statistical Area 2 (SA2) codes. Each patient, in CAT4, has their address mapped to a SA2 code. Once an SA2 code is assigned to a patient, it can be linked to data sets available outside of the practice clinical information system such as immunisation rates and ABS data.

PAT BI Database Server Specifications

	Minimum Requirements	Recommended Requirements

Operating System	Windows Server 2012 (Standard/R2) X64 or higher	
Processor	8 Logical Cores	32 Logical Cores or more
RAM	16 GB	64 GB or more
Hard Disk	500 GB*	1 TB* or more
Microsoft .NET Framework	.NET 3.5, 4.5 and 4.6.1	
Database	Microsoft SQL Server 2014 Standard Edition	Microsoft SQL Server 2016 Standard Edition
Other Requirements	• SQL Server Management Studio • Mixed Mode Authentication • SQL Server Agent • Firewall exception for connectivity - Standard SQL server ports are • TCP 1433 • UDP 1434 • Remote access facilities for installation and maintenance by Pen CS • with local admin privileges and database owner privileges	
Operational Requirements	• We recommend having an experienced database administrator to maintain the database and the server • The PHN holds the sole responsibility to protect and/or manage the database (including related artifacts) and the server	

* Refer to the Estimated Database Size Growth table.

Estimated Database Size Growth

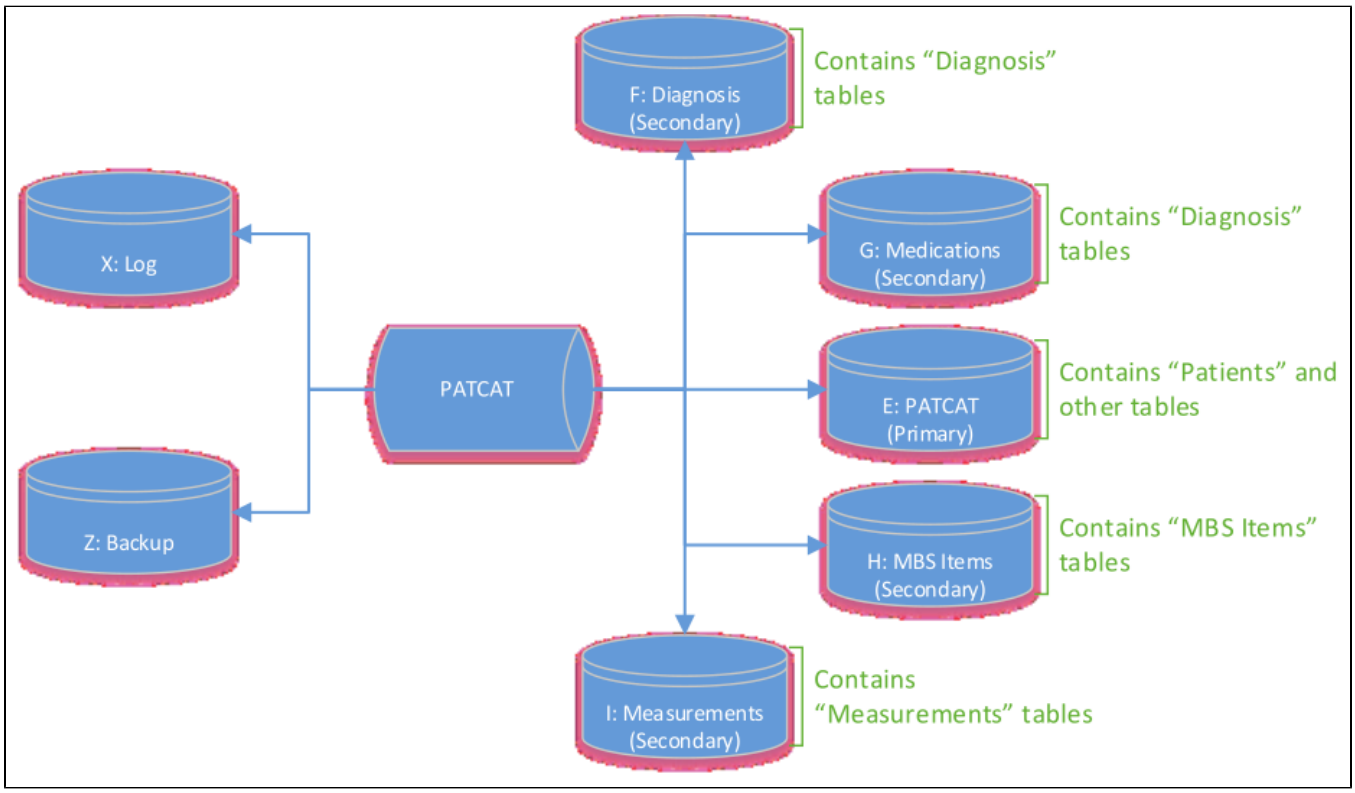
Patients per Extract	Total Practices	Total Duration of Submission (months)	Total Patients for the Duration	Estimated Size (GB)
12,000	250	3	9,000,000	140
12,000	250	6	18,000,000	279
12,000	250	9	27,000,000	419
12,000	250	12	36,000,000	558
12,000	250	15	45,000,000	698
12,000	250	18	54,000,000	837
12,000	250	21	63,000,000	977
12,000	250	24	72,000,000	1,116
12,000	250	27	81,000,000	1,256
12,000	250	30	90,000,000	1,395
12,000	250	33	99,000,000	1,535
12,000	250	36	108,000,000	1,674
12,000	250	39	117,000,000	1,814
12,000	250	42	126,000,000	1,953
12,000	250	45	135,000,000	2,093
12,000	250	48	144,000,000	2,232
12,000	250	51	153,000,000	2,372

12,000	250	54	162,000,000	2,511
12,000	250	57	171,000,000	2,651
12,000	250	60	180,000,000	2,790
12,000	250	63	189,000,000	2,930
12,000	250	66	198,000,000	3,069
12,000	250	69	207,000,000	3,209
12,000	250	72	216,000,000	3,348
12,000	250	75	225,000,000	3,488
12,000	250	78	234,000,000	3,627
12,000	250	81	243,000,000	3,767
12,000	250	84	252,000,000	3,906
12,000	250	87	261,000,000	4,046
12,000	250	90	270,000,000	4,185

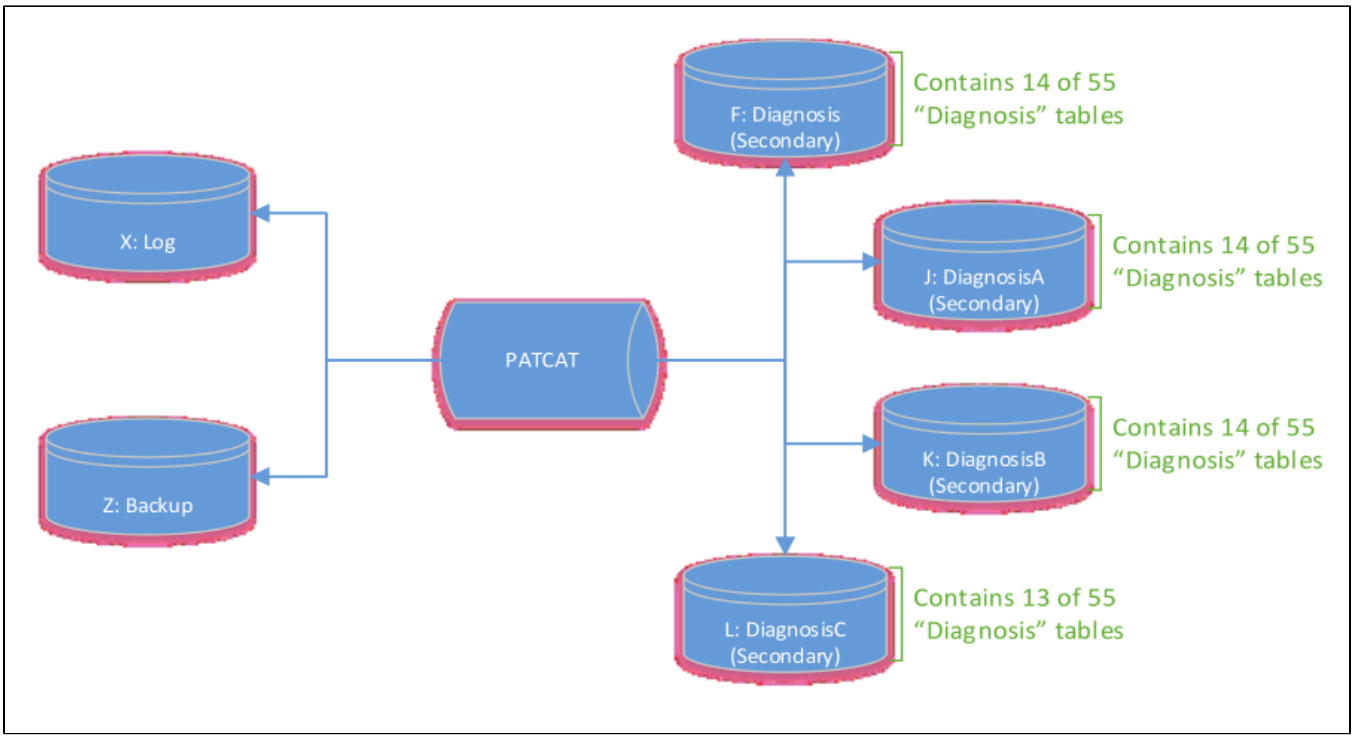
"Estimated Size (GB) =((Patients Per Extract ×Total Practices ×Total Duration)/1,000,000)×15.50

Complex Database Storage

Data growth will eventually hit a limit where increasing disk space is no longer possible. In order to solve the limit issue, we can split the data into multiple drives. Splitting data over multiple disk increases performance of read and writes operations as this spreads the I/O loads, allowing for parallel queries and specific backup/restore of data.



When a drive reach its storage limit, it's possible to split the data into multiple drives. An example (below) shows the Diagnosis split into 4 disks (other secondary tables has been omitted).



Important: Splitting data into multiple disk incurs a maintenance overhead and complexity in backups, they should be reviewed when splitting data into multiple disks. We recommend having an experienced database administrator to maintain the database and the server. The PHN holds the sole responsibility to protect and/or manage the database (including related artifacts) and the server
Large databases are the domain of a DBA/System engineer for a large database. The below items form the basis of the decision that a DBA/System engineer will need to make as the database grows. These include but are not limited to:

• **Data Disk** o Quality SSD etc
• Size (one large, many small)
• Disk Controllers (number of, disk per controller, quality of, speed, cache size) o RAID
• Type (SAN, NAS, DAS)
	• **CPU**
	  ◦ Type
	  ◦ Speed
	  ◦ Number of
	  ◦ Number configured for SQL Server
	• **Memory**
	  ◦ Type
	  ◦ Speed
	  ◦ Total Size
		• **High Availability**
		  ◦ fallover clustering
		  ◦ Database mirroring
		  ◦ Log Shipping
		  ◦ Replication
		  ◦ Scalable shared data
		• **Network**
		  ◦ Type
		  ◦ Speed

• **Backup/ Restoration Plan** • Recovery Model • Full backup cycle • Differential backup cycle • Log backup • Restoration procedures	• **Maintenance Plan** • Data and log file management (size of files) • Index fragmentation (when to defrag) • Statistics (when to recalculate) • Corruption detection	• **Monitoring** • All of the above • Long running quires • File growth • Number of users/ applications

In addition to the PAT BI Database you also get a detailed Database Schema document that will explain exactly how the database tables are connected to each other. Below is s sample template of the PAT BI Database Schema,

Medication_Hormone_Replacement_Therapy_Oestrogen_Only			
Active	bit	Yes	The status of 'Hormone Replacement Therapy Oestrogen Only'. This will either be True, False or NULL. For example: • Patient has an active (True) 'Hormone Replacement Therapy Oestrogen Only' • Patient has an inactive (False) 'Hormone Replacement Therapy Oestrogen Only' • Patient does not have (NULL) 'Hormone Replacement Therapy Oestrogen Only'
End_Date	datetime	Yes	The end date and time of 'Hormone Replacement Therapy Oestrogen Only'
ExtractID	bigint	No	The reference identifier of an extract. Use this column to query data for an extract or collection of extracts
ID	bigint	No	The primary key and seed
PatientID	bigint	No	The reference identifier of the patient. Use this column to query data for a patient or collection of patients
Prescription_Date	datetime	Yes	The date and time of the prescription