



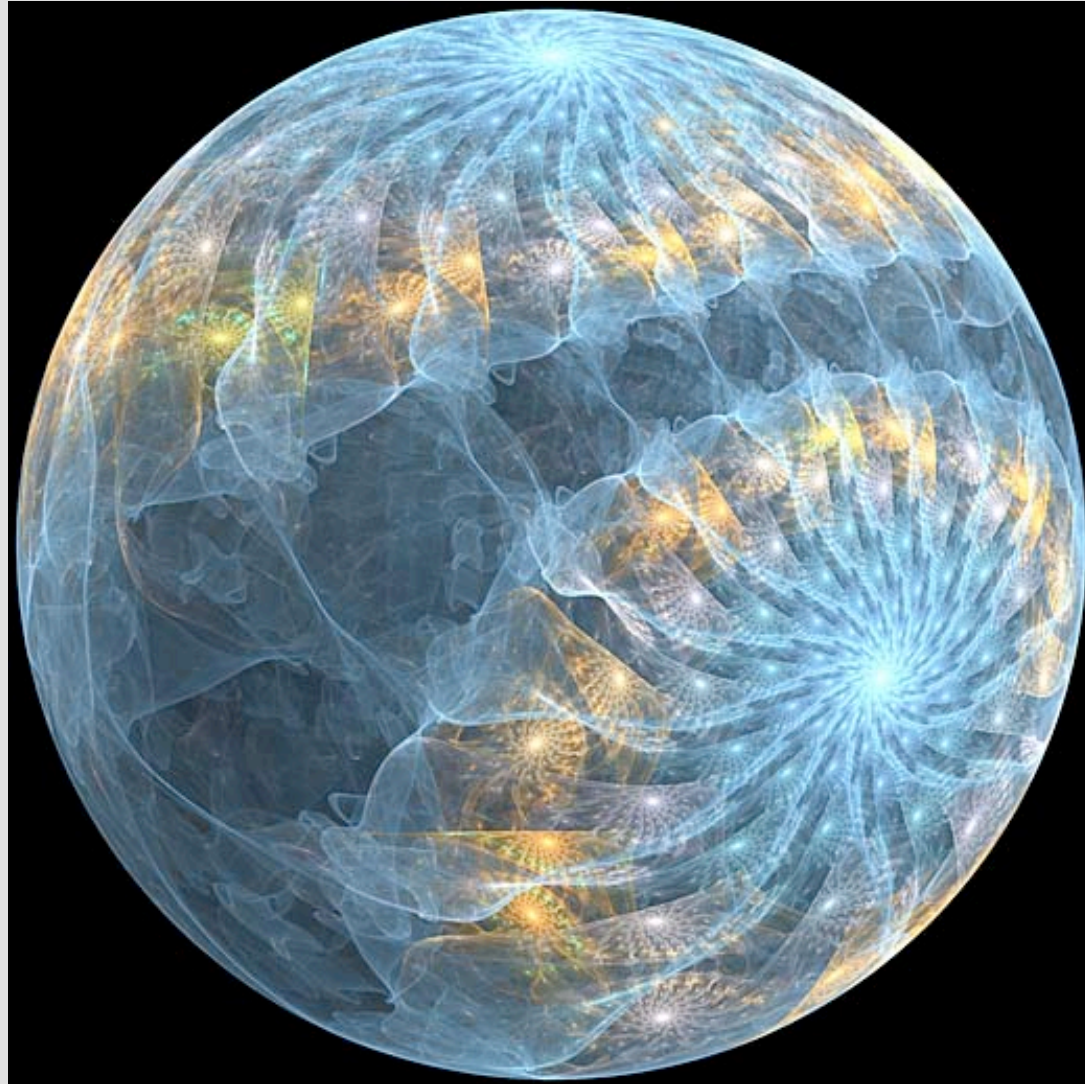
Nevada Seismological Laboratory
University of Nevada, Reno

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Nevada Seismological Laboratory Reno Data Center

- ◆ Ubuntu file and RT servers, RH Linux backups, Solaris RT servers, token OSX
- ◆ 2Tb and 4Tb Enterprise Grade drives.
- ◆ Locally Sourced Supermicro Servers \$7500 w/48Tb, dual quad core Intel. NO DELL.
- ◆ 100Tb Current Storage
- ◆ Software RAID 1,5,6
- ◆ Ongoing Operational Continuity Planning
- ◆ Co-locations at UNLV, looking at DEM
- ◆ Generator-Backed Electrical and Cooling

“RTAPPS”

- ◆ Nearly three years running & tuning
- ◆ Event Driven
- ◆ ORB-based process communication
- ◆ Character packets e.g. “/ch/event_new”
- ◆ Rapid Implementation of New Programs
- ◆ Non-waveform-based processing
- ◆ Primarily drives 3rd party software
- ◆ Integrated With Analysts Work Flow
- ◆ Mostly perl, some C.

Character Packet Process Communication

- ◆ Packet contents:
Evid:Orid:Mag:Time:PrimaryDB:SnapshotDB
- ◆ Applications listen for other packet types
- ◆ Applications write their own packet type



Current Processes:

- ◆ Event Listener
- ◆ Reporter
- ◆ ShakeMap
- ◆ Moment Tensors
- ◆ Website Content Generator
- ◆ Short Period Focal Mechanisms
- ◆ HAZUS Input Generator



Start Stop	System is up	Load Average		Cpu Usage (16 cpus) 656 processes	Memory Usage		Disk Usage root waveforms	Orb Ring Buffer Status foxx:12348	
		1min	0.43		ram	swap		pkts/s	7 connections
		5min	0.37		3841 Mb	8192 Mb		In	0.000
		15min	0.35					Out	0.000

Processing Tasks

Task	Pid	cpu	cpu	rss	rss	To Orb	From Orb	Latency
rtexec	2182	0.00	12.00	3.9	1000			
orbserver	2228	0.00	12.00	36.8	1000			
orbListener	12474	0.03	12.00	7.1	1000			
dbListener	2750	0.00	12.00	32.4	1000			
mwcalc	9838	0.00	12.00	6.1	1000			
db2shakemap	12754	0.00	12.00	4.9	1000			
eids_notifier	7088	0.00	12.00	72.1	1000			
eids_server	8237	0.00	12.00	106.8	1000			
rt_reporter	13201	0.00	12.00	16.0	1000			
rt_web	27326	0.00	12.00	367.5	1000			
rt_focalmech	21006	0.00	12.00	77.7	1000			
rt_timer	2987	0.00	12.00	4.0	1000			
rt_hazus	12247	0.00	12.00	3.7	1000			

Cron Job Status

rtapps_clean

patches

cleanlogs

processes	ORB_Clients	ORB_Sources	ORB_Data	DB_data	Quanterra	Event_Map	Grid_Map
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RTAPPS Applications Standards

- ◆ All make use of the Snapshot Database to read event data and deposit generated products
- ◆ All use Antelope-style parameter files.
- ◆ All are usable in single run mode.
- ◆ Standardized character packet structure (a few exceptions incl Moment Solution)
- ◆ Processes run their Init() routine when finding a packet that is theirs. This reads the PF file and sets the current event parameters.

Examples: Event Listener Process

- ◆ Listens for NetMag packets on main RT
- ◆ Listens for Database Events
- ◆ Excerpts a snapshot database
- ◆ Polygon testing for larger region
- ◆ Hypoinverse location
- ◆ Teleseism filters
- ◆ Filter ETYPE for uninteresting events.

RT Reporter Process

- ◆ Listens for Event and Moment Packets
- ◆ Polygon Testing for ANSS reporting polygons.
- ◆ Time filter – ignore old events.
- ◆ EIDS Reporting (EQXML, QuakeML)
- ◆ EIDS Deletion
- ◆ EIDS Moment Tensor Solutions

DB2ShakeMap Process

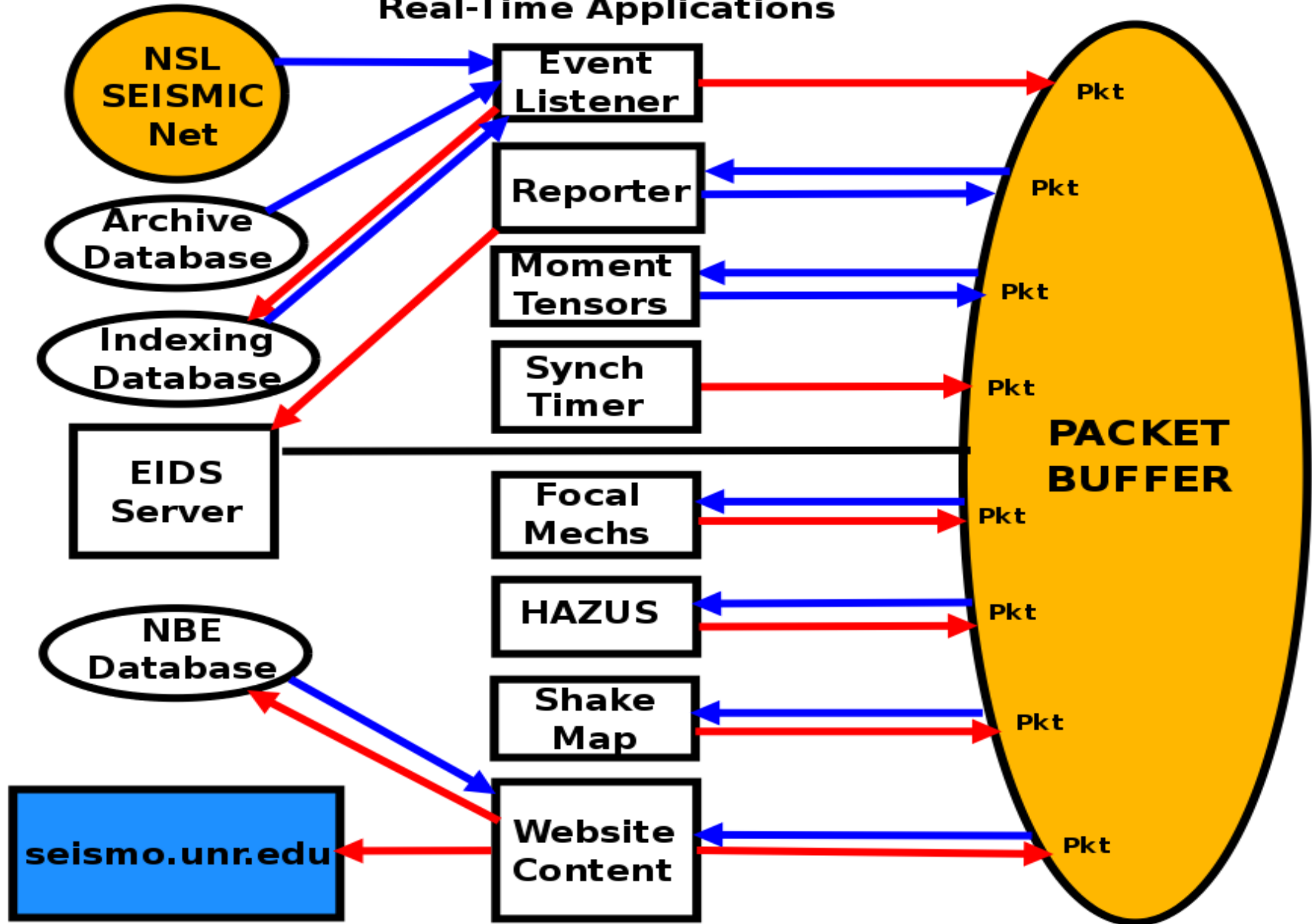
- ◆ Full rewrite of db2shakemapxml.
- ◆ Listens for several different packet types, including new event, new Moment solution, changes to existing events.
- ◆ PSA Using C-code
- ◆ PGV Using dbwfmeas
- ◆ KML Map Polygon Overlays
- ◆ Runs and Uploads ShakeMaps



RT Web Process

- ◆ Listens for all packet types
- ◆ Generates PHP, JavaScript
- ◆ NO WEBSITE-SIDE ANTELOPE APPS
- ◆ Concatenates Snapshot Databases for Recent Earthquake Lists.
- ◆ Syncs the Snapshot Database and all Products to Website

Real-Time Applications



○ ORB □ PROCESS ○ Database

← READ
→ WRITE

Summary

- ◆ Rewriteable with EVPROC, currently no need.
- ◆ Easy to add processes and programs into event loop.
- ◆ Simple packets can be written into the orb from remote scripts, to trigger processing: example is event deletion or review flagging.
- ◆ Can be distributed....a little messy
- ◆ Future work to include event notifications, State of Health monitoring for the system (monitoring application).