# NCSS Network Services at Menlo Park

Legend:
- GCDA shared memory (red)
- Earthworm transport (blue)
- Network socket (black)

Real Time Processing Systems

export_ack

export_ack

FILTERPICK_RING

adadup

adadup

pkfilter

ADA

PICK_RING

pick_ew

carlstatrig

rad

WDA

SNCL_RING

ew2wda

import_ack

waveforms from acquisition machines

coaxtoring

picks from remote EW nodes
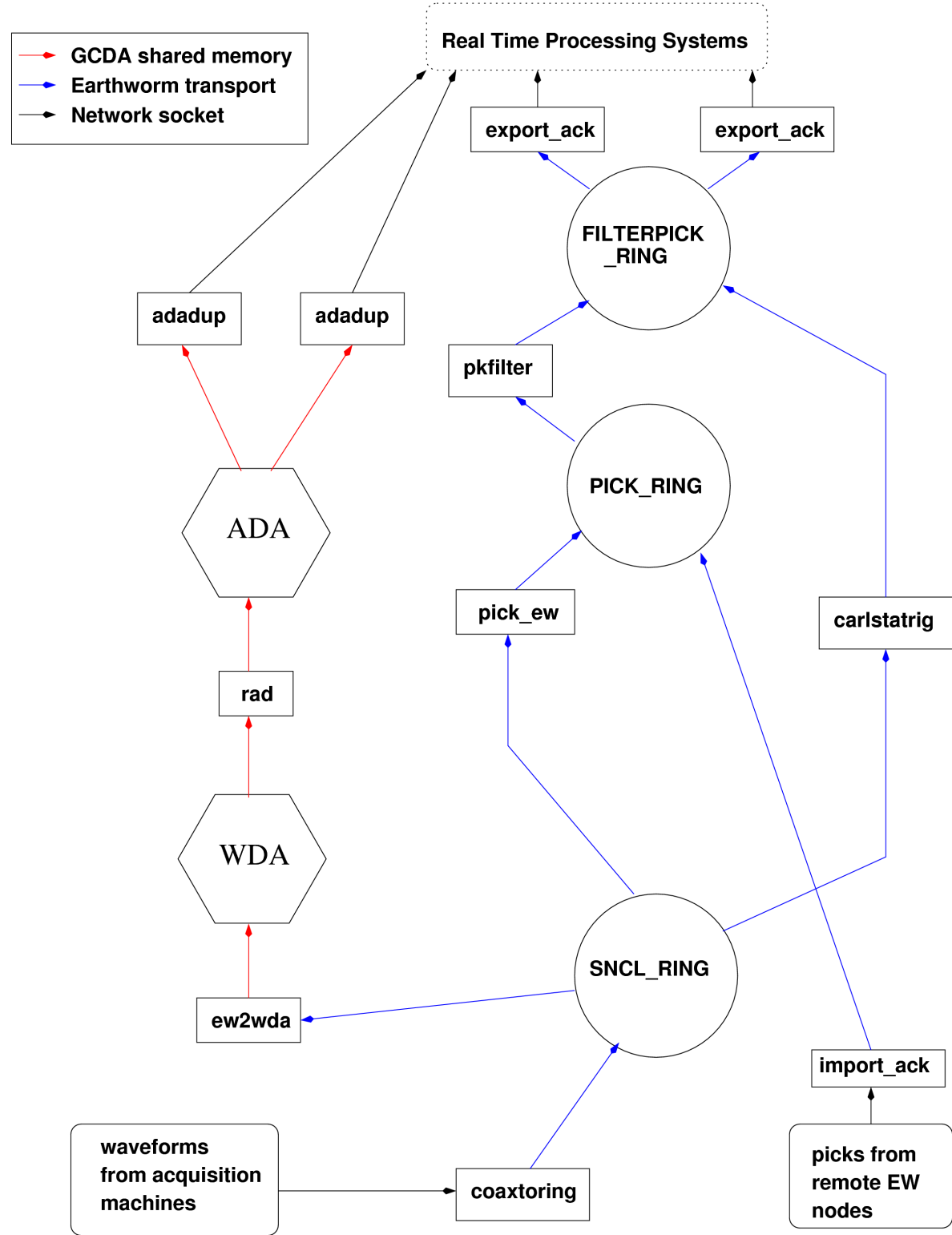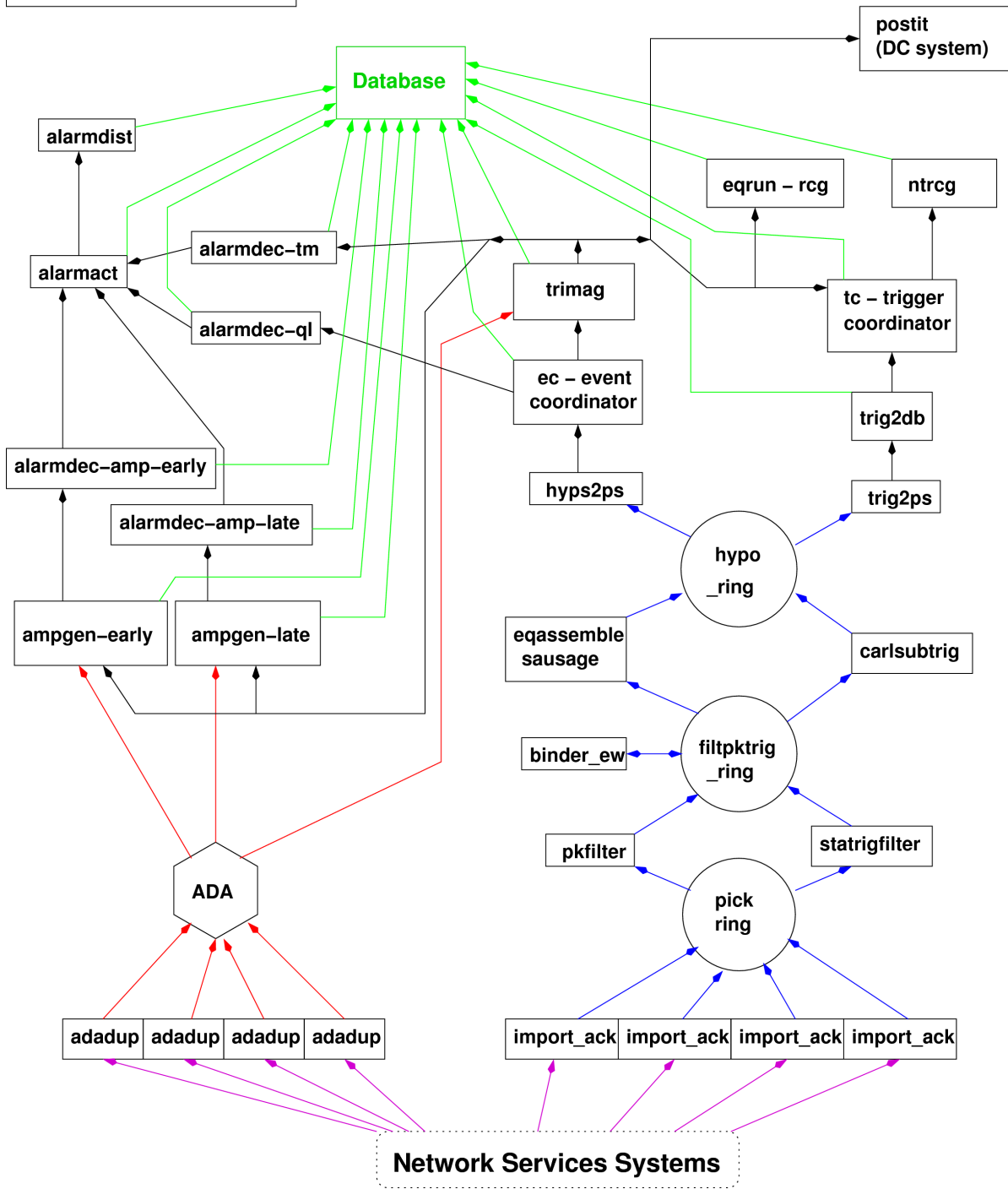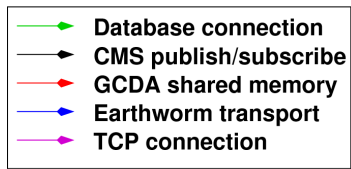
# WDA waveform feeders

- ew2wda – reads from EW waveform ring
- cs2wda – reads from Comserv shared memory
- mcast2wda – read from Comserv-style multicast

# RAD2 – Realtime Amplitude Data

- time-domain estimation of amplitudes
- sample composed of multiple values:
    - Wood-Anderson
    - PGA, PGV, PGD
    - Spectral Acceleration at 0.3, 1.0, 3.0 sec
    - time, quality values for each
- 1 sample every 5 seconds
- uses broadband and strong-motion channels
- Kanamori, Maechling, Hauksson; BSSA Feb 1999

# NCSS AQMS Real−Time System

**Legend:**
- → Database connection (green)
- → CMS publish/subscribe (black)
- → GCDA shared memory (red)
- → Earthworm transport (blue)
- → TCP connection (magenta)

**Database**

postit (DC system)

alarmdist

eqrun − rcg

ntrcg

alarmdec−tm

alarmact

trimag

tc − trigger coordinator

alarmdec−ql

ec − event coordinator

alarmdec−amp−early

trig2db

alarmdec−amp−late

hyps2ps

trig2ps

ampgen−early

ampgen−late

hypo _ring

eqassemble sausage

carlsubtrig

filtpktrig _ring

binder_ew

ADA

pkfilter

statrigfilter

pick ring

adadup  adadup  adadup  adadup

import_ack  import_ack  import_ack  import_ack

**Network Services Systems**

# CMS – CISN Messaging System

- Publish-Subscribe message passing
  - message subject determines routing
- Based on QWServer (EIDS, CISNDisplay)
- Non-volatile storage until message delivery
  - "qfiles" written by CMS client library for pub/sub
  - CMS server "storage" files
- Messages have types
  - mismatched types may cause subscriber error or crash

| Subject | Published By: | Subscribed By: |
|---------|---------------|----------------|
| /parameters/hypocenters/eqassemble/archive | hyps2ps | ec |
| | | |
| /parameters/detections/evtdetect | - | ec |
| /parameters/detections/carlsubtrig | - | ec |
| | | |
| /parameters/events/eventcoord | ec | - |
| /parameters/events/eventcoord/cancel | ec | - |
| /signals/eventcoord/event | ec | trimag |
| /signals/eventcoord/quicklook | ec | alarmdec-ql |
| /signals/eventcoord/cancel | ec | sendcancel_runner |
| | | |
| /signals/trimag/magnitude | trimag | ag_early |
| | | ag_late |
| | | eqrun_rcg |
| | | alarmdec-tm |
| | | tc |
| | | |
| /signals/ampgen/amps | ampgen | alarmdec-amp |
| /signals/ampgen/amps_early | ag_early | alarmdec-amp-early |
| /signals/ampgen/amps_late | ag_late | alarmdec-amp-late |
| | | |
| /alarms/RT | alarmdec-tm | alarmact-rt |
| | alarmdec-amp | "" |
| | alarmdec-amp-early | "" |
| | alarmdec-amp-late | "" |
| | alarmdec-ql | "" |
| | | |
| /actions/alarm/RT | alarmact-rt | alarmdist-rt |
| /actions/cancel/RT | sendcancel-rt | "" |
| | | |
| /parameters/trigger/carlsubtrig/subnettrig | trig2ps | trig2db |
| | | |
| /signals/trig2db/trigger | trig2db | tc |
| | | |
| /signals/trigcoord/event/assoc | tc | - |
| /signals/trigcoord/event/unassocevent | tc | - |
| /signals/trigcoord/event/unassoctrig | tc | ntrcg |
| | | |
| /signals/ntrcg/event | ntrcg | - |

# EC – Event Coordinator

- Parses hypoinverse msg from hyps2ps

- Writes event to database

  - assigns event ID

  - compile-time option to handle codas and Md's

- Originally intended to wait for multiple event detection sources – no longer used

- Option for quick event notification

  - event with 25 assoc. P phases (NCSS)

# Trimag

- computes Ml (and Me), writes to DB
- harvests amps from ADA for WA, energy values
- tries prelim Ml; if successful then final Ml
- tries to remove "outliers"
- does better with lots of BB, SM stations
  - NCSS: doesn't run unless Md >= 3.0

# ampgen

- harvests SM amps from ADA, writes to DB
- depends on RAD2 MaxVelocity, MinAccel
  - tries to select one set of on-scale channels per sta
- CISN runs two instances
  - early ampgen for sta's within 310 km; 130 sec delay
  - late ampgen for sta's 310 – 800 km; 280 sec delay

# rad2 configs for ampgen

|  | units | standard | NC BB/SM | NP SM |
|---|---|---|---|---|
| MaxVelocity | cm/sec | 1.00 | 0.10 | |
| MinAccel | cm/(sec*sec) | 0.75 | 0.03 | 0.06 |

# rcg – request card generator

- request card: SNCL, time window
- select SNCLs by mag-distance rules
- time window based on P and S travel times
- writes to request_card DB table

# Trig2ps & Trig2db

- trig2ps reads TRIGLIST msgs from EW ring

  - publishes trigger CMS message

- trig2db reads trigger CMS message

  - writes subnet trigger to DB
  - DOES NOT create an Event entry
  - publishes trigger ID to CMS

# tc – Trigger Coordinator

- subscribes to trigger and event ID msgs
- test binder event and subnet time coincidence
- for triggers without concurrent binder event:
  - generate new event ID and table entry
  - publish CMS message for new event

# NTRCG

- Subscribe to trigger-event msgs
- generate request cards for SNCLs in subnet trigger
- channel name mapping allows additional channels for a station
- time windows based on trigger on/off times
- writes to request_card DB table