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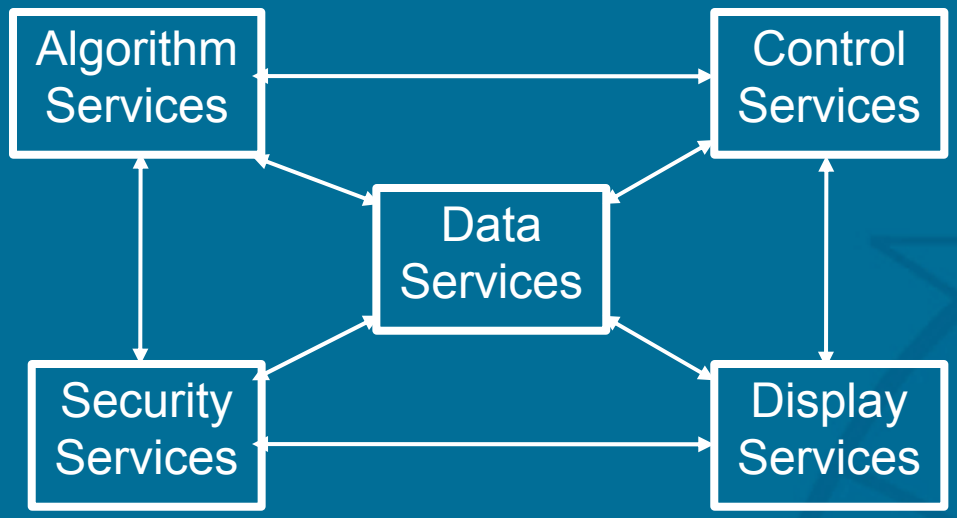
Community Hydrologic Prediction System CHPS

George Smith

June 2004



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CHPS – Why?

- ***Enable new science into operations***
- ***Allow access to expanded model suite***
- ***Enable distributed hydrologic modeling***
- ***Provide flexible access to data***
- ***Enable ensemble processing***
- ***Support parallel processing***
- ***Support distributed development***
- ***Support scientific collaboration***

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Service Oriented Architecture (SOA)

- ***In an SOA, data, algorithm, and infrastructure assets are accessed by routing messages between network interfaces***
- ***Services encapsulate complex processes and systems, permitting controled change and continuous improvement of the underlying implementations***
- ***Addresses challenge of leveraging and managing software assets across an organization***

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SOA - continued

- ***An SOA can operate on a single platform or, to realize its full potential, across platforms***
- ***Not something we're inventing – SOA is the basis of Internet development and web services***
- ***Contrast with NWSRFS, a procedural, monolithic application***
  - NWSRFS traded architectural flexibility for performance
  - CHPS will attempt to attain both

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SOA - benefits

- ***Encapsulation of data and algorithms makes it simpler to replace or insert new modules***
- ***No central recompiling of entire system needed***
- ***Provides more streamlined process to work with outside groups on new capabilities***

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SOA – benefits (continued)

- ***Data and algorithms are structured and identified through service protocols***
  - NWS could become a data or algorithm provider because CHPS services can be accessed by whomever has appropriate rights
  - Explicitly supports distributed processing
- ***Time from research to operations is reduced because adding new algorithm or data service does not impact existing services – regression testing minimized***

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CHPS – How?

- ***Adapt SOA to support NWS Hydrologic Forecasting business***
  - **Incremental development/deployment**
  - **Overall architectural design**
  - **Proof-of-concept build/test**
- ***RFS continues every day while evolving to CHPS architecture***
  - **Expand design element by element**
  - **Deliver new functional/data components as soon as they're ready**

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CHPS – When?

- *Develop Vision for evolving NWSRFS – November 2002*
- *Proof-of-concept workflow management service demonstrated – August 2003*
- *Architectural overview – January 2004*
- *RRS data service design – May 2004*
- *RRS prototype development – completed Fall 2004 (negotiating task now)*
- *Deploy of CHPS-RRS for RFC beta testing – 2005*
- *Find opportunities to add new algorithm services (i.e., USACE ResSIM) – as resources allow*

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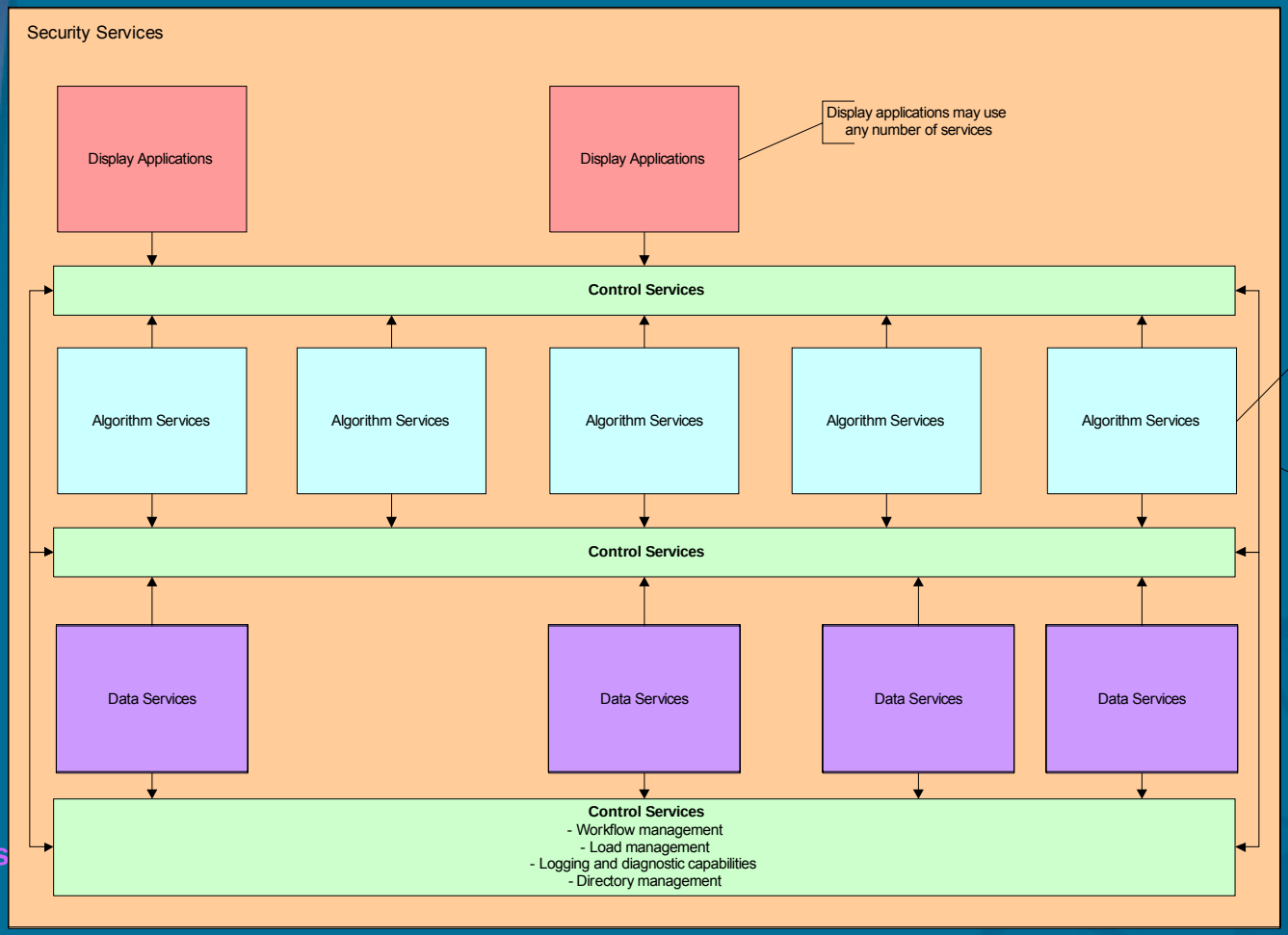
NOAA: NWS - OHD | Conceptual Application Architecture (January 9, 2003)

CHPS – Architectural overview



Note All components shown above reside in one or more application servers. Application servers may be located at NWS headquarters, any RFC or WFOs, and each application server may be configured with any combination of display applications, algorithm services and data services. Control services will have to be deployed uniformly across all application servers who participate in the OHD operational environment.

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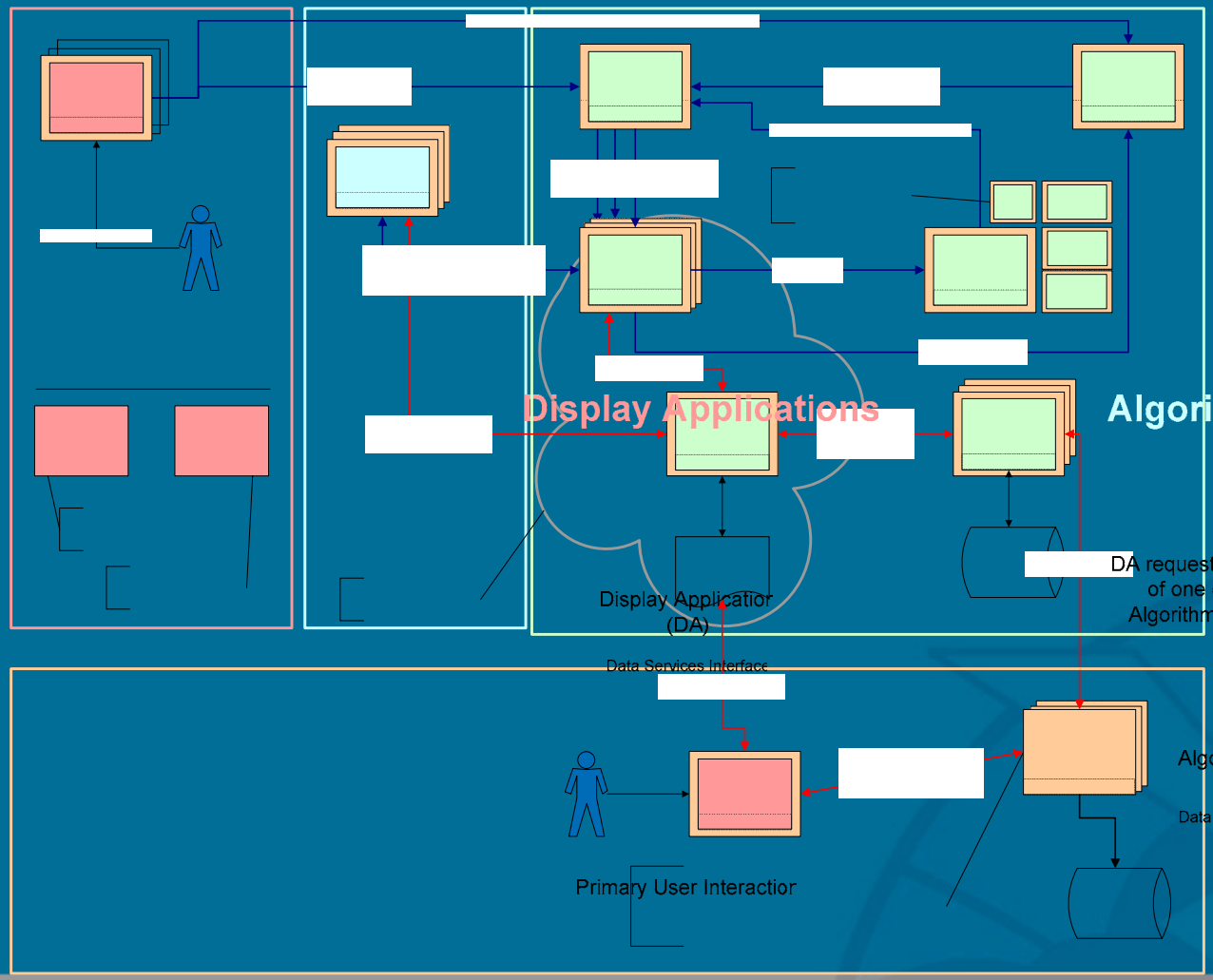
CHPS – Display, Algorithm, Control, Security



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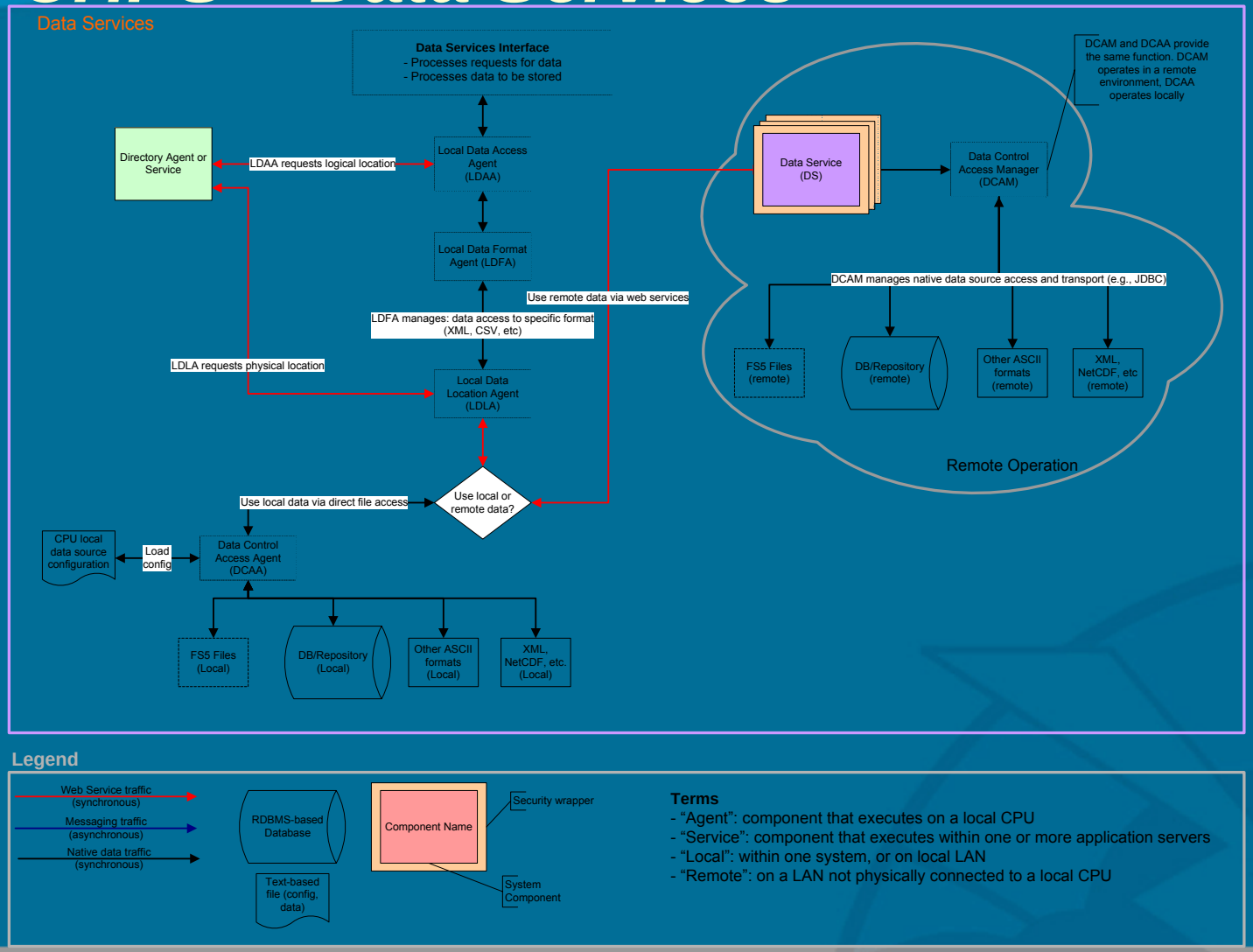
CHPS – Data Services



Legend

Terms
- "Agent": component that executes on a local CPU
- "Service": component that executes within one or more application servers
- "Local": within one system, or on local LAN
- "Remote": on a LAN not physically connected to a local CPU

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CHPS – RRS Data Service

- ***Design the details of Data Service by using the River, Reservoir, and Snow (RRS) Preprocessor as an example of CHPS architecture evolution***
- ***Intentionally simple – to test viability of access to data currently in fs5files structure***
- ***Deliver an NWSRFS AWIPS version with RRS data from CHPS Data Service and the rest of the RFS functions (MAP, MAT, FCEXEC, etc.) accessing data as they are presently (fs5files)***

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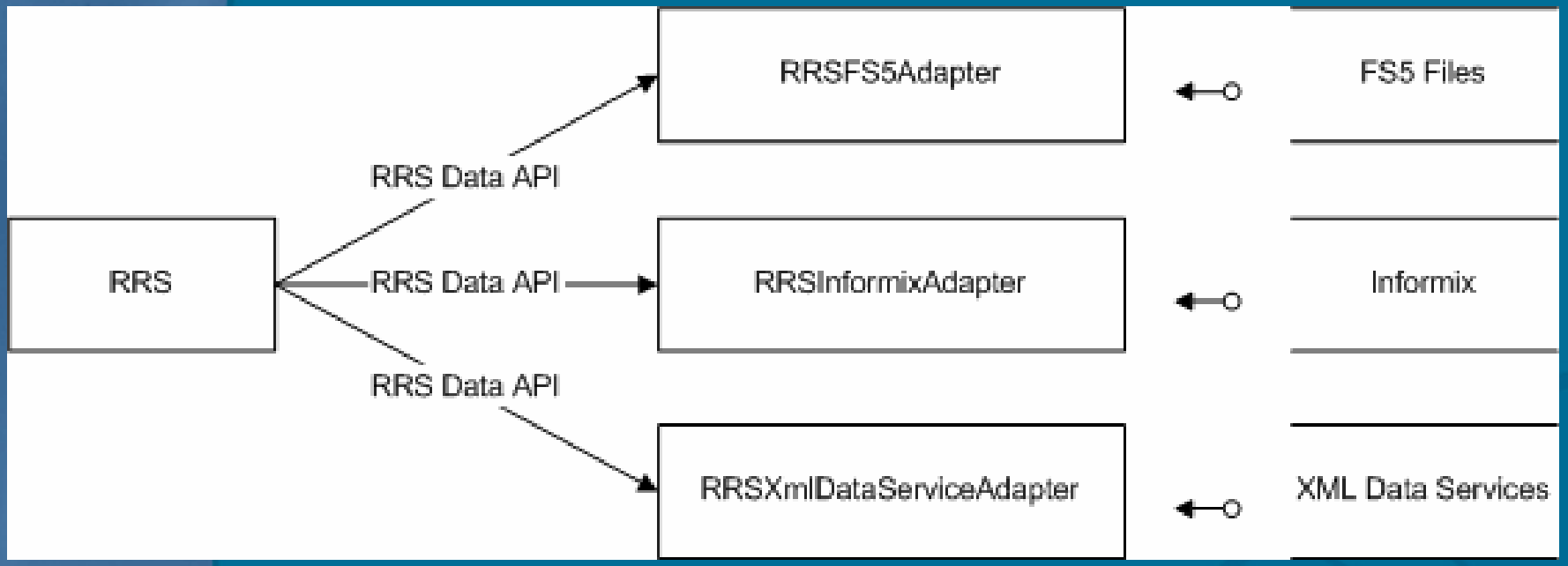
RRS Data Services API options



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www.nws.noaa.gov/oh/hrl/hseb/hseb_pdf_links.htm

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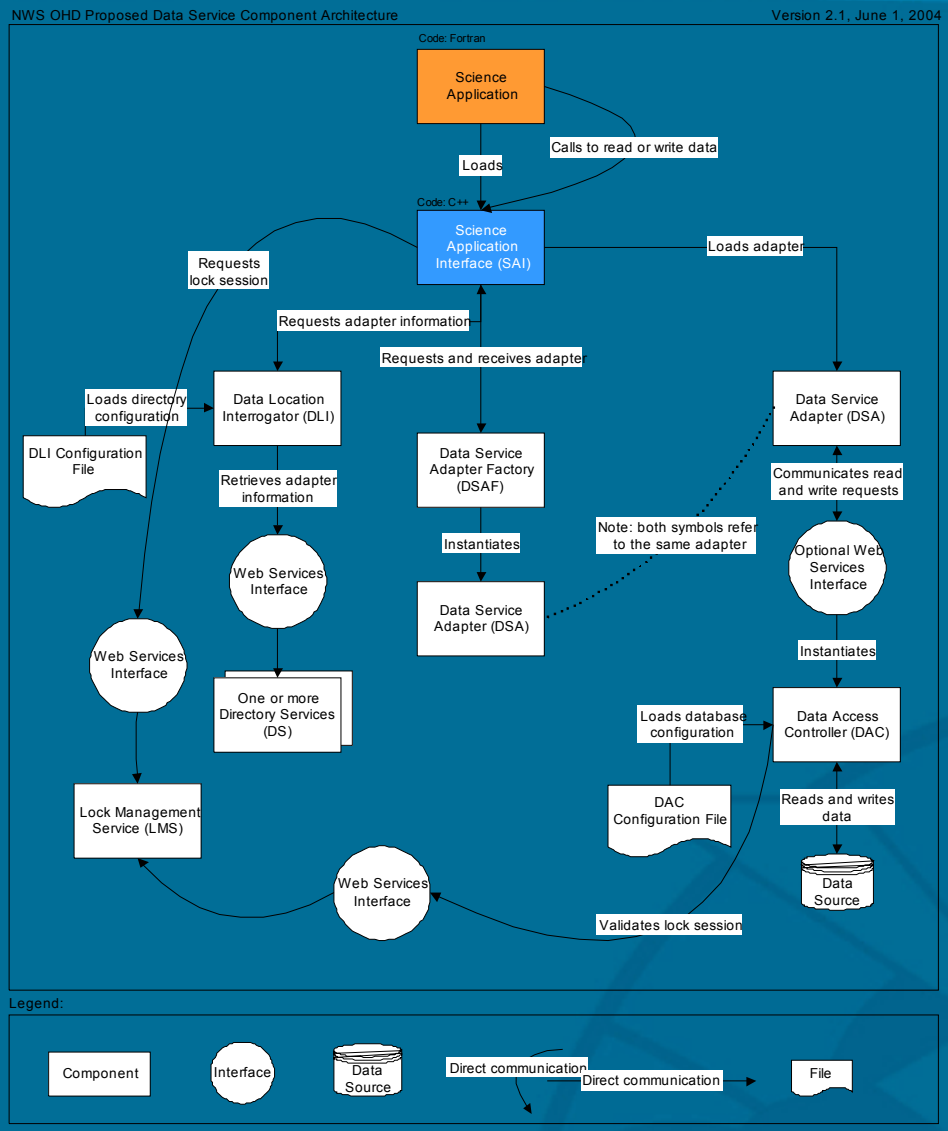
RRS Data Services Components Overview



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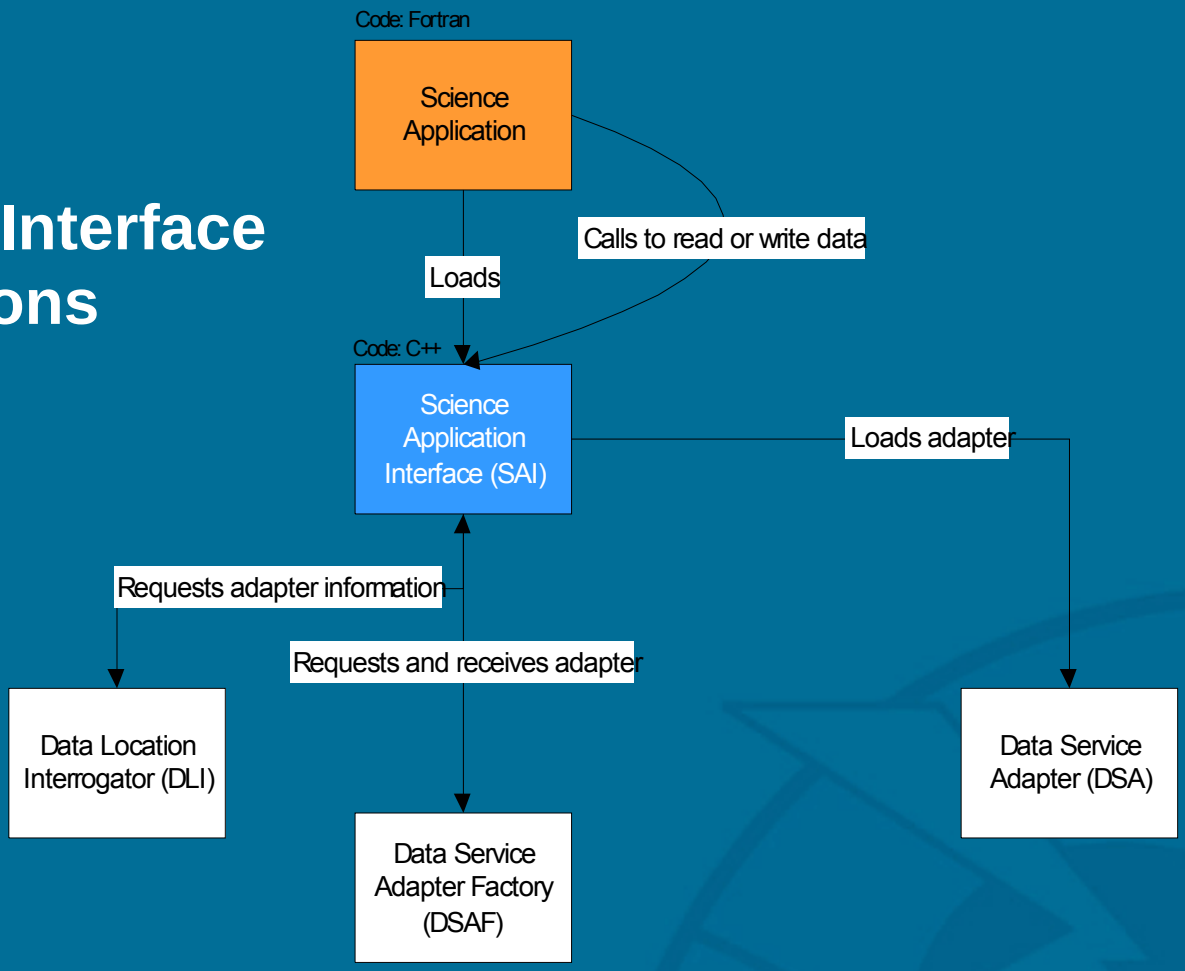
RRS Data Services Science Application Interface component interactions



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CHPS – Expanded opportunities

- ***When converting functions to CHPS structure can simply retain existing functionality (as with RRS) or modify to add desired functionality (as with MAP)***
- ***Once SOA strategy is proven in RFC operations can support concurrent development of new algorithm, data, or display services***
  - **Additional opportunities for RDM activities**
  - **Additional opportunities for collabortion with Federal water or University partners**

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RRS Data Service Details

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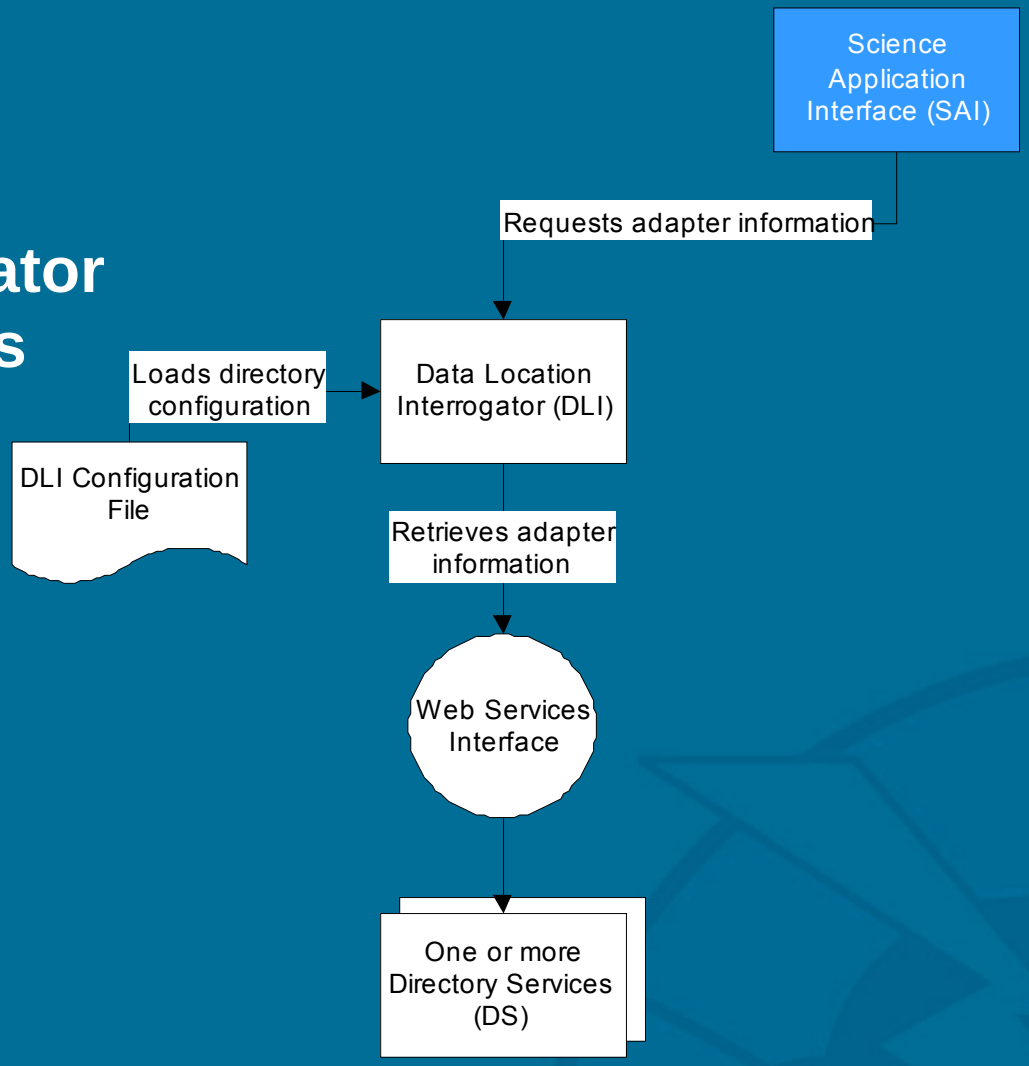
RRS Data Services
Data Location Interrogator component interactions



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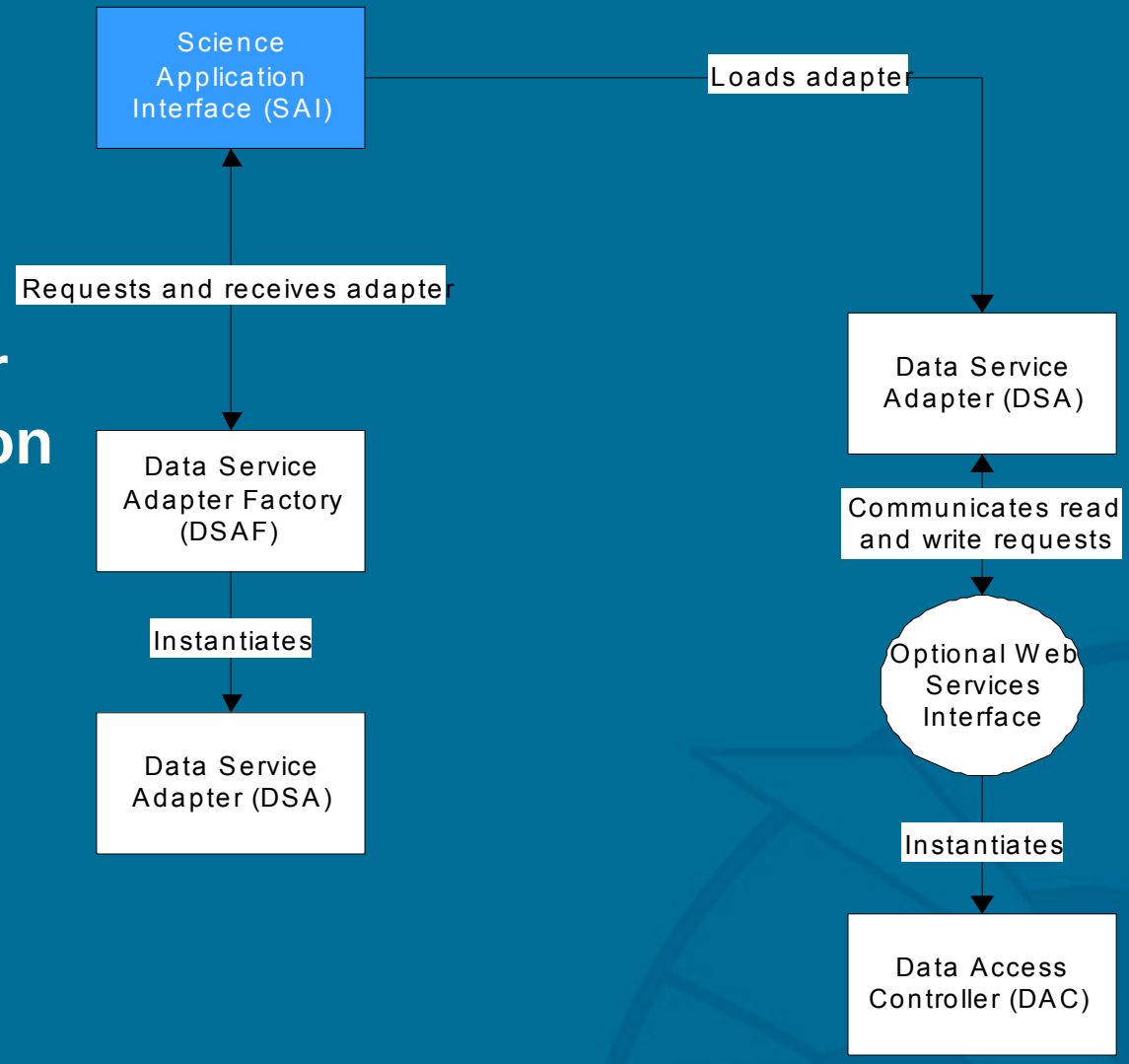
RRS Data Services Data Service Adapter component interaction



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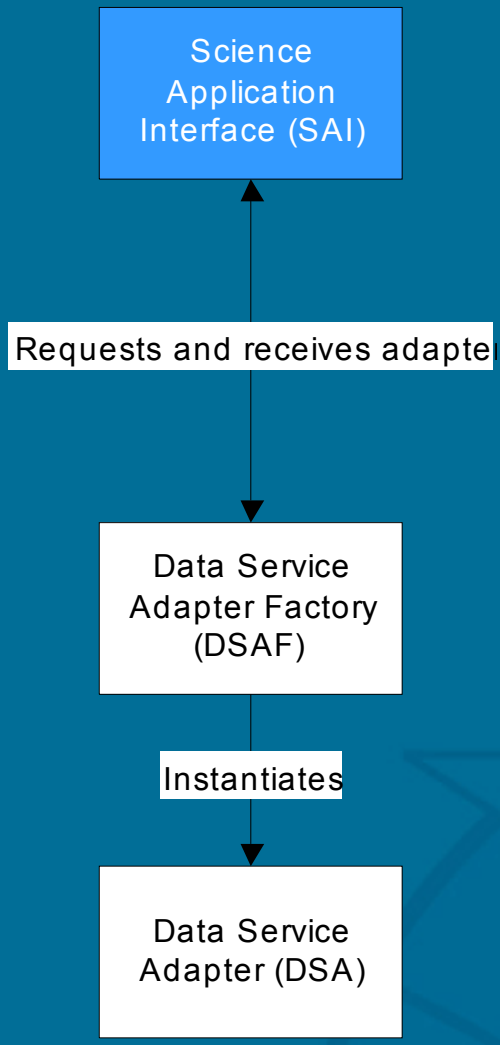
RRS Data Services
Data Service Adapter Factory component interaction



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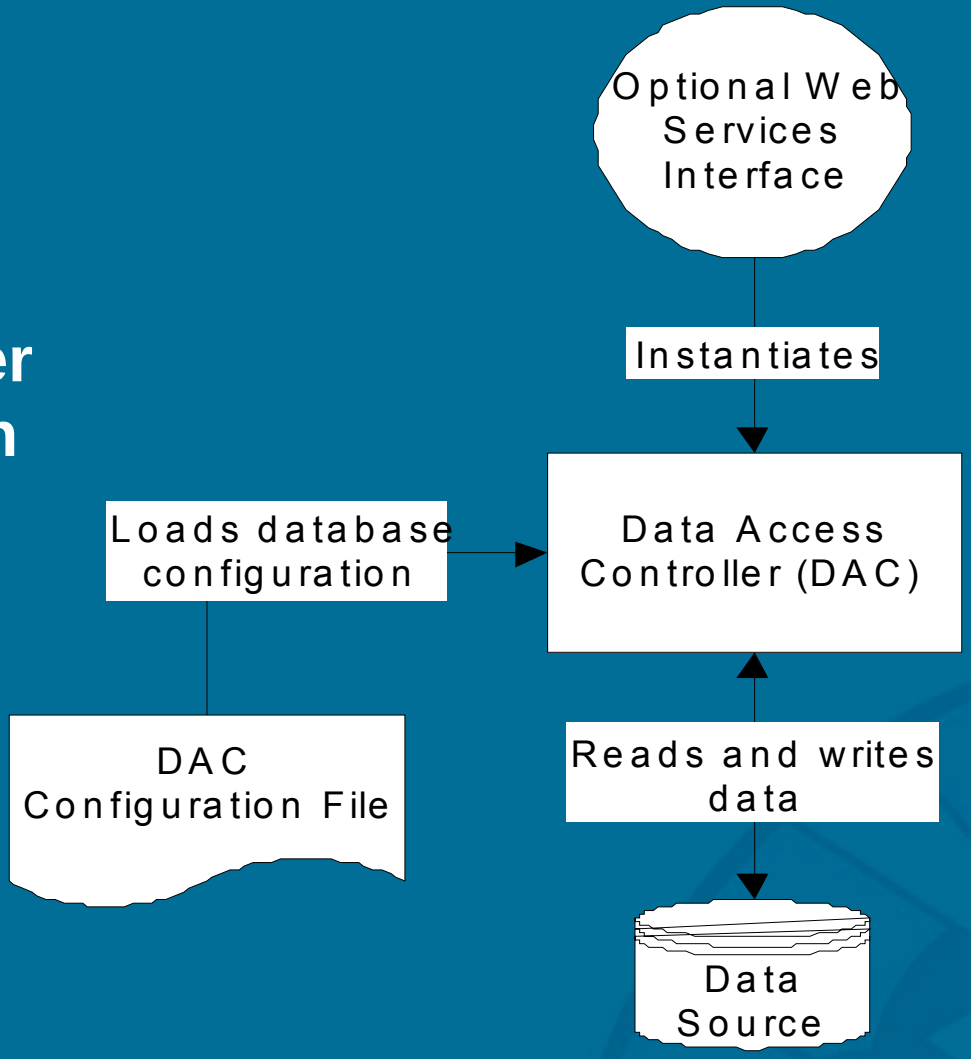
RRS Data Services Data Access Controller component interaction



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