

## DAPPER: AN OPeNDAP SERVER FOR IN-SITU DATA

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### 1. Introduction

Dapper is a Web server that provides universal access to in-situ data from OPeNDAP (the Open Source Project for a Network Data Access Protocol) [1] enabled client programs. This allows OPeNDAP enabled clients such as GrADS, Ferret, Matlab, or IDL to have remote access to thousands of in-situ oceanographic observations (including real-time TAO buoy array observations from PMEL and global real-time sea level data from the University of Hawaii) that are available through the Climate Data Portal (CDP) [2].

### 2. Architecture

Dapper contains a set of configurable **services** that convert in-situ data formats into the OPeNDAP protocol and stream the data to an OPeNDAP client (Fig. 1). These services are implemented as a Java servlet. There are currently two data conversion services in Dapper – a Climate Data Portal service that converts

CDP profiles and time series to OPeNDAP, and a netCDF service that provides fast streaming conversion of individual NetCDF files to OPeNDAP.

The CDP consists of a CORBA (Common Object Request Broker Architecture) server, a relational database for metadata management, and a set of netCDF files that contain data for individual profiles or time series. Each netCDF file corresponds to one profile or time series.

The Dapper CDP service converts requests from an OPeNDAP client to a corresponding set of CDP requests. The CDP requests are made through a CORBA ORB (Object Request Broker) which then returns data to Dapper and streams it out in the OPeNDAP protocol. Metadata queries, such as profile coordinates, tend to be quite fast since the relational database obviates the need to access individual netCDF files. Profile or time series data are returned to the client using the OPeNDAP Sequence datatype.

Some OPeNDAP clients do not support OPeNDAP

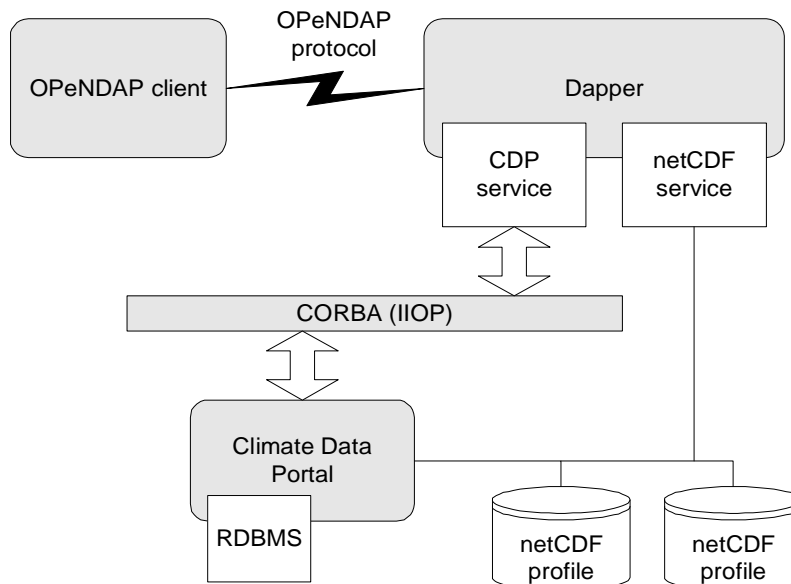


Fig 1 Dapper system architecture

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sequences. For these clients, the individual CDP netCDF files are available through the Dapper netCDF service. This service can read netCDF files (through an enhanced version of Unidata's Java netCDF library [3]), and convert the netCDF files to the more widely supported OPeNDAP Grid or Array datatypes.

Dapper also supports a Web interface that allows users to browse metadata and dataset directories.

### **3. Performance**

The netCDF server is a true streaming server – the data resulting from an OPeNDAP request are not fully read into memory before being streamed out to the client. This results in data delivery rates of around 120 Mb/sec on a commodity PC (2.4GHZ Pentium 4 with 1 GB of DDR 3200 memory, 7200 RPM WD 120GB hard drive).

On the same PC, it takes about 500 us/profile to read metadata from the database and about 5 ms/profile to read all of the data from 1000 individual profiles containing 1000 data points.

### **4. Availability**

The Dapper Web interface is currently available at <http://www.epic.noaa.gov/dapper/>

### **5. Acknowledgments**

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### **6. References**

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- [3] <http://www.unidata.ucar.edu/packages/netcdf-java>