Capacity Building for exchange and utilisation of climate information

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Introduction

- Facilitate the cooperation in the exchange of information and services so that nations are able to cope with climate related disasters
- APCC not only about MME, but should also deal with a host of evolving issues related to its general mission
- Would like to discuss about general issues related to information exchange and its utilization

Towards better utilisation of climate information

Don't expect that what is needed to promote utilisation of climate information is to put up all your data on a server

Issues

A)Data not available

- Political will
- Lack of data processing/serving technologies

B)Complex format of provided data

C)Don't know what to do with the information

Complexity of data formats

- Data formats are constantly evolving for various reasons
  - Ascii, Flat Binary
  - GRIB, BUFR, NETCDF
  - HDF3(4,5,EOS)
  - For instance, it does not make much sense to put high density but sparse data such as satellite swath data on a regular grid

Complexity of data formats

- Implications for users
  - Average user may find it hard to catch up with evolving data formats
  - Even more so, specialist investigators from other disciplines
    - A health-climate researcher may want a slice of available data in a simple text format
  - HDF3(4,5,EOS)
  - For instance, it does not make much sense to put high density but sparse data such as satellite swath data on a regular grid

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Climate Information Exchange systems elsewhere

- ACIS (Applied Climate Information System , USA)
- MARS (ECMWF)

Distributed or Centralised

- Centralised
  - Comprehensive collection of data from elsewhere, provided to users in unified format
  - APDRC of Univ. Hawaii, ADSS of APCC
  - Large amount of resources needed

Distributed or Centralized

- Distributed
  - Sharing of resources
  - A multitude of data servers cooperate to provide data needs of users
  - Some amount of redundancy needed to maintain smooth operations

Distributed Data Service

- Data Service
  - Complexity maintained at database level
  - Made manageable for users at software level
  - OpenDAP as an example
  - Uses adapters to remap server data to persistent format

Distributed Data Service

- Data Retrieval
  - Semantics based
    - Provider: NCEP
    - Type: Reanalysis
    - Format: Ascii
    - Longitudes: 40 E to 120 E
    - Latitudes: 30 S to 30 N
    - Grid: 2 x 2
    - Period: 1Jan1990 to 31Dec2007

Data Exchanger - DEX

- Prototype (Proof of concept) technology being developed at APCC
- A collection of data retrieval and processing technologies together with a frontend for data service

Data Exchanger - DEX

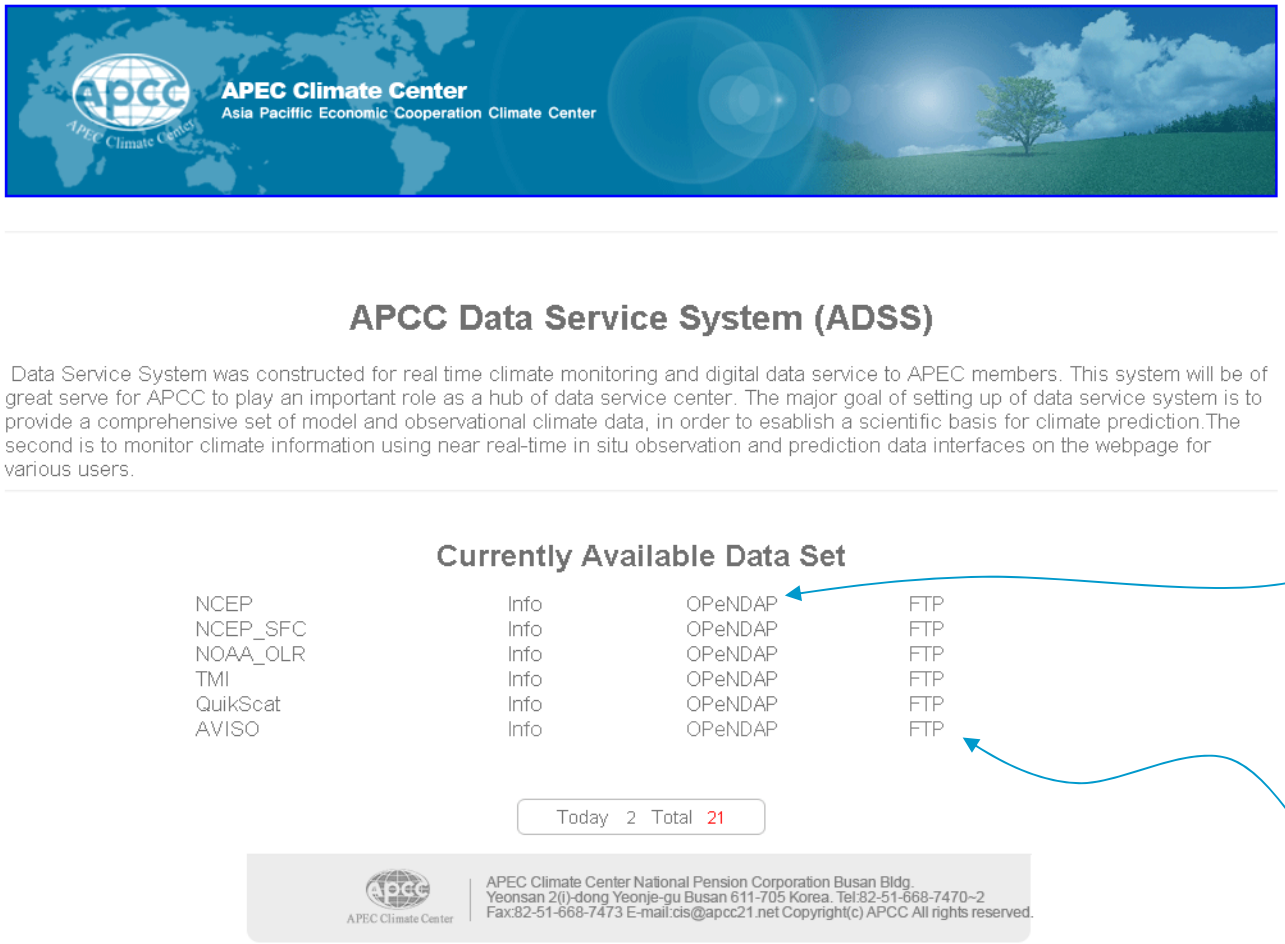
- Data Retrieval
  - Automated retrieval from a variety of servers providing binary or netcdf data
  - Automated post processing and remapping to a common data format (netcdf) and structure
  - Current available databases
    - Observations/Reanalysis
    - Multi model predictions

Data Exchanger - DEX

- Data Service
  - Various levels of security
    - Registration and login
    - Access Control List allows only registered IP addresses to access the server
  - Simple interface for data request
  - User can regrid, remap, update or redistribute data

APCC Data Service System (ADSS)

Digital Data Service : Open access data sets



Data from a variety of sources and formats are provided to user in single format

Open DAP Service

allows user to cut and

slice data as needed

Conventional FTP

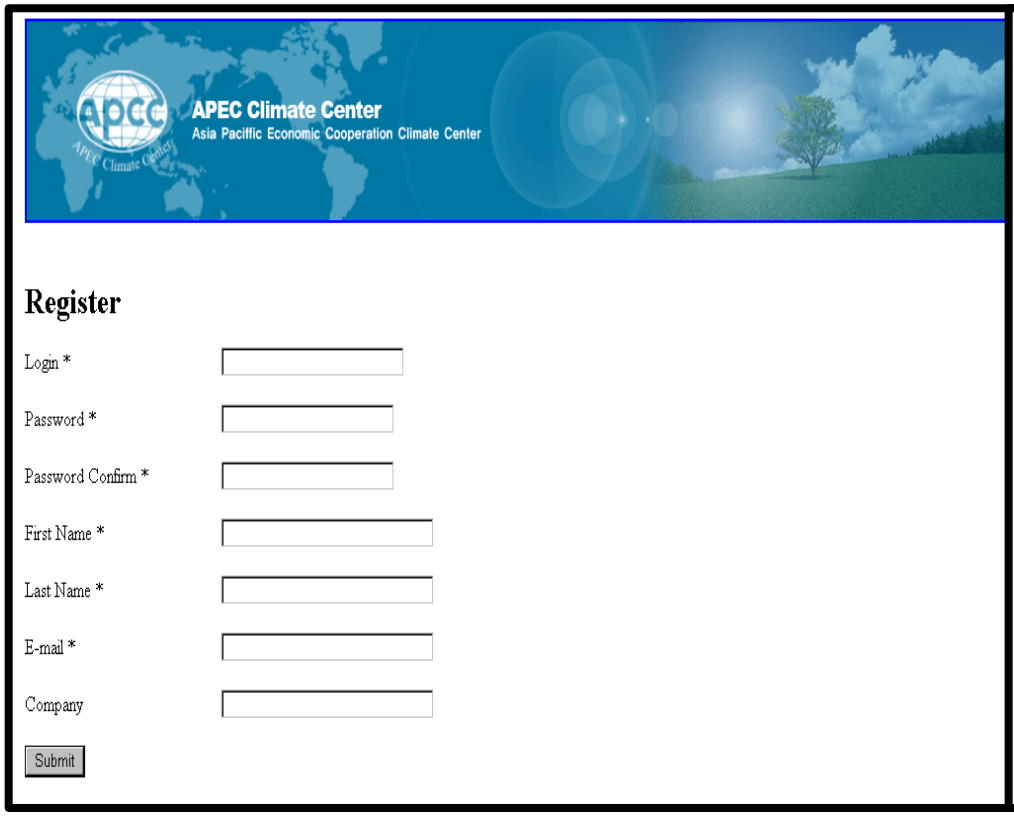
Service is also provided

- **Real-time data sets – updated weekly**

APCC Data Service System (ADSS)

Digital Data Service : limited access data sets

ADSS Registration page



ADSS Login page

- **Multi-Model Ensemble Forecasts/Hindcasts – updated monthly around 4th week of each month**

Data Exchanger

- Enable easy and flexible access to APCC data for expert users
  - Expert user can
    - Retrieve APCC data in a variety of formats (binary, ascii, netCDF, grib)
    - Cut and slice data for domain of interest
    - Regrid data using various algorithms
    - Update local database easily with single command

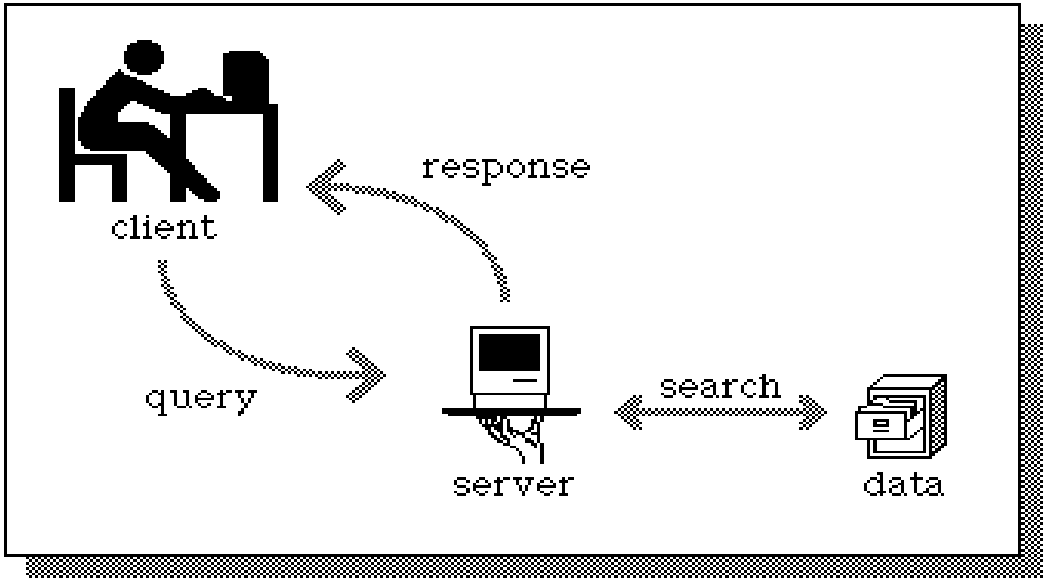
Data Exchanger

Client

Data request through terminal

Local database Management

Post process to user specs (regrid/reformat)



Slice/Aggregate from database

Search/Logging services

Server

Utilisation - CLIK

- Facilitate generation of climate information
- Web-based tool for data retrieval and multi model prediction
- An integrated collection of algorithms (Framework) for various climate related calculations

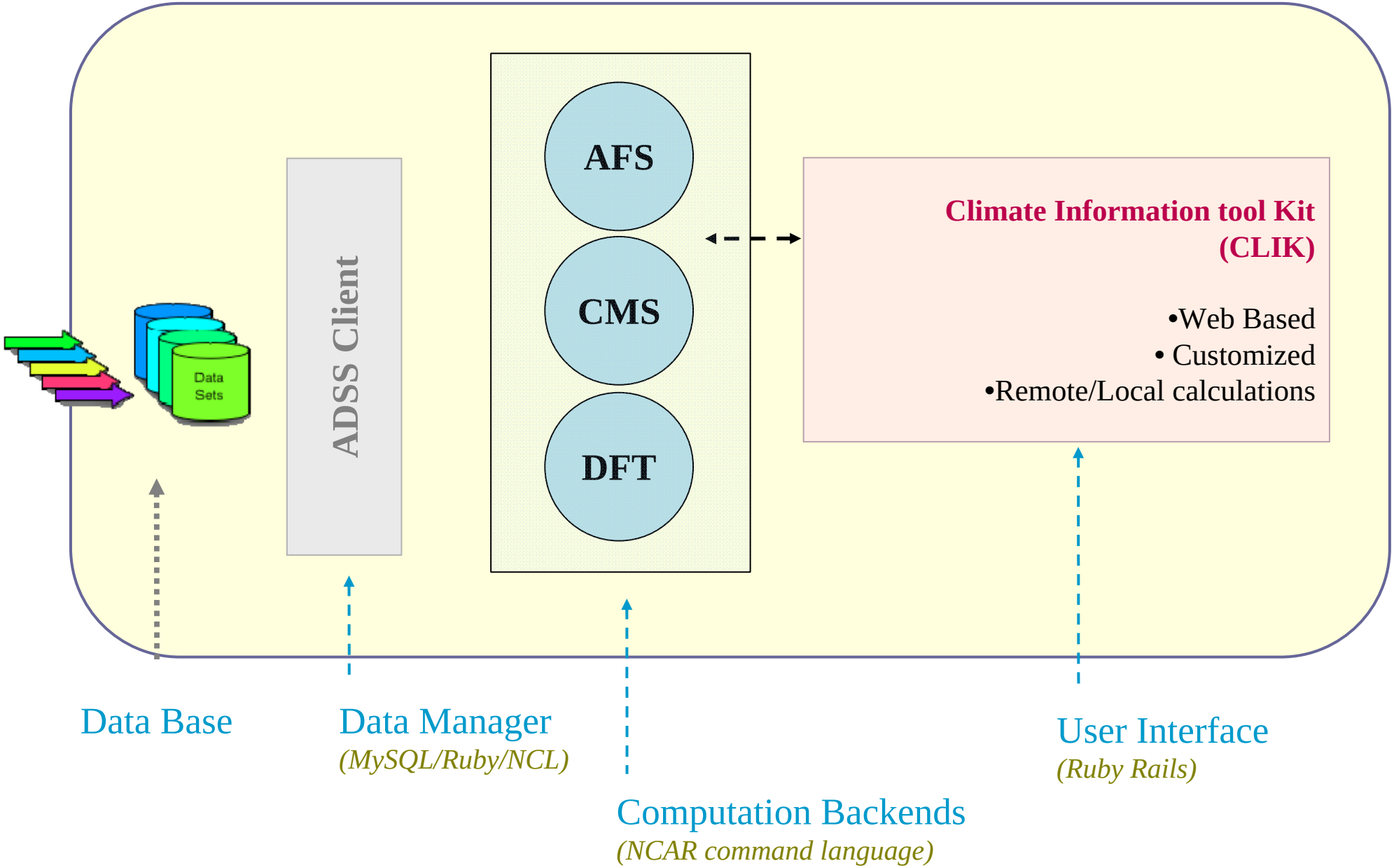
CLIK - internals

- Based on NCAR Command Language (NCL) and Ruby on Rails
- Both powerful frameworks, extensive API, easy to use existing Fortan/C codes
- Modular, can extend capabilities by writing Fortran subroutines for example
  - Sophisticated MME or downscaling schemes can be implemented by user if needed

Distribution

- Servers in local organisations meet demands of local community
- Further plans
  - DEX : adapters for other data than netcdf
  - DEX : two way data exchange
  - CLIK : SOAP interface for online calculations

CLimate Information tool Kit (CLIK)



Ideas for using CLIK/DEX

- Reverse cascade (ref. Peter Chen's presentation of Aug 19)
- Exchange downscaled predictions with Global producers
- Co-ordinated examination of prospects of downscaling may be required
  - Where can downscaling improve skills (cf. Antonio Moura's discussion about caution in downscaling)
  - How much improvement of skill may be expected?
  - Experiments under similar conditions