

Xcache & Event Delivery Systems

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<http://xrootd.org>

Xcache & Event Data Delivery Systems

Based on amalgam of ...

- ESS & iDDS

- https://indico.cern.ch/event/765245/contributions/3449040/attachments/1869870/3079541/iDDS_SC_Jun_2019_1.pdf (Tadashi Maeno & Wen Guan)

- Service-X

- https://indico.cern.ch/event/765245/contributions/3470867/attachments/1869892/3076485/weinberg_ServiceX190626.pdf (Marc Gabriel Weinberg)

Xcache + ESS/iDDS



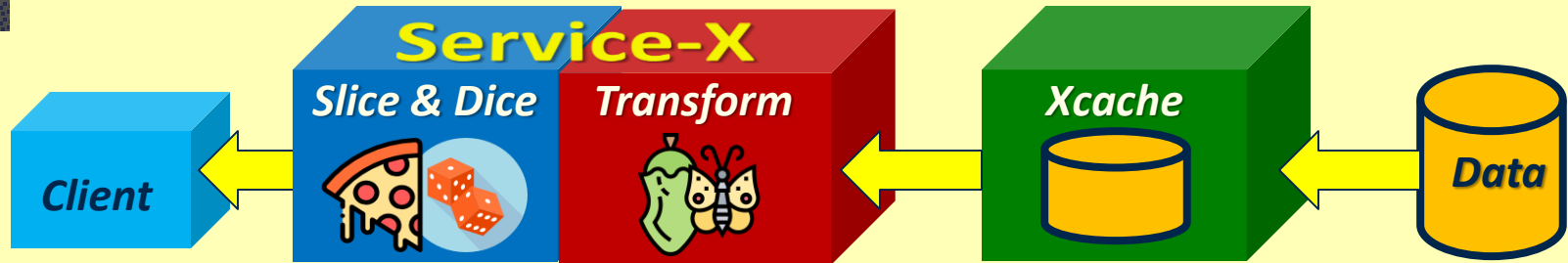
Produce Consumable Event Bundles

- CEB's can be processed within job time limit
 - Geared for production workflows
 - Interestingly, can be made adaptable via ML/AI

Best **Xcache** placement is not clear

- This can be done in many other ways but ...
 - **Xcache** allows timely data management via CCM

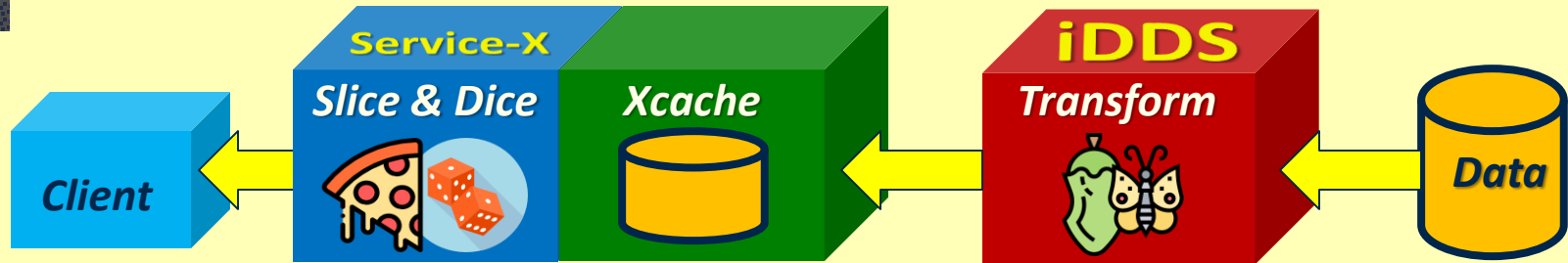
Xcache + Service-X



Basic Service-X arrangement

- Not optimal due to constant transformation
 - However, data retransmission is avoided
 - Assuming data reuse (likely due to the model)
- Focus here is on essentially event streaming
 - Good for analysis workflows

Xcache + iDDS + Service-X

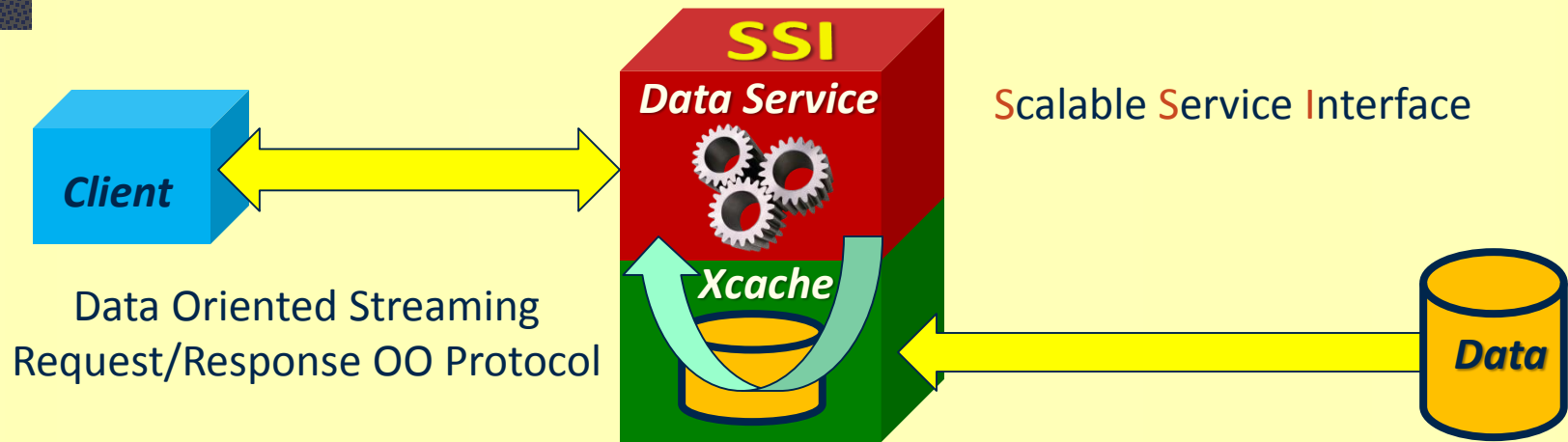


- # Transformation done by iDDS
 - Best data format is flexible (root, parquet, etc)
- # Transformation is cached
 - Slicing and dicing done on transformation
 - Can be part of **Xcache** or a separate service
 - Allows better data reuse by other applications

So Many Arrangements!

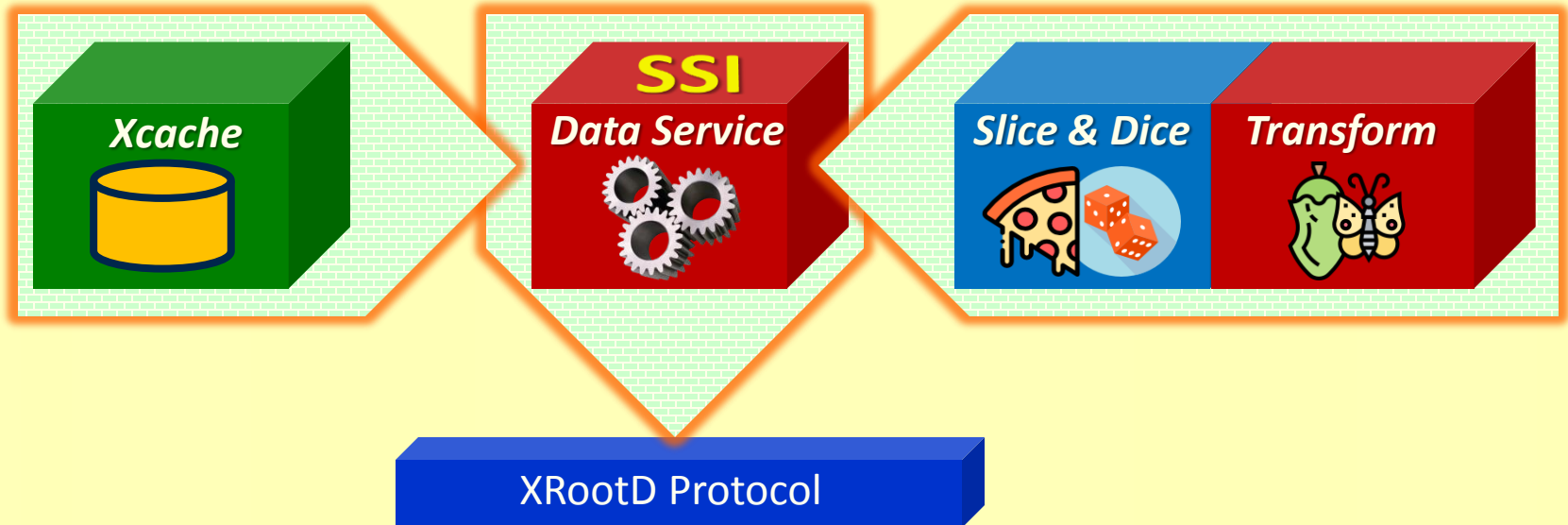
- # Perhaps we need a super framework
 - To piece together all the data-oriented service components
 - Provide a uniform easy way to create a service
- # Fortunately, there is such a framework
 - And it's been successfully used!

The SSI Architecture



- # Supports multiple data channels per request
 - Streaming or discreet data delivery
 - Meta-data can be sent ahead of time
 - Separate async client notification channel
- # Used by qserv (LSST) and CTA (CERN)

Service Bundling via Plugins



- # A full self-contained data service
 - Composed of discreetly stacked plugins
 - The exact positioning of components is fluid

Conclusion

- # **Xcache** is a powerful tool for event services
 - Especially when used as a stream buffer
- # Flexible framework for data access models
 - Wide applicability via an agnostic approach
 - Data format as well as access protocol
- # Utility is dependent on how it's used
 - Care needed in proper data flow placement
 - Extensions should be well thought out