

Reduced Mini as New Micro

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- **Options for implementing the New Micro**
- **Comparing Mini and Micro**
- **Reduced Mini description**
- **Status and Conclusions**



How to Implement the New Micro?

- **Start from scratch**
 - Impractical, given time and manpower constraints
- **Improve the existing Micro**
 - Very technically challenging to achieve all the requirements
- **Reduce the Mini**
 - **The full Mini is too big to serve as New Micro as-is**
 - ▲ A conclusion of the CMWG2 report
 - **Re-configuring the Mini can greatly reduce its size**
 - ▲ Reconfiguration is supported by **existing production code**
 - **Reusing the Mini as New Micro has some attractive features**
 - ▲ Mini has robust and efficient data packing
 - ▲ New Micro would be naturally compatible with reco output
 - ▲ Reusing the Mini would consolidate BaBar's software
 - **Some issues remain**
 - ▲ Does the reduction strategy meet analysis needs?
 - ▲ Can reduce Mini provide interactive access?



Mini/Micro Comparison

Features	(existing) Micro	Mini
What is stored	BtaCandidates (no reference to reco objects)	Reco objects (TrkRecoTrk, etc. BtaCandidates are built on read)
Track persistence	Pion fit at the origin	All possible fits
Emc persistence	Energy + position + moments	EmcCands + Digis
Persistence technology	Root and Objy	Objy
Interactive access?	Yes	No
Configurability	None	Highly configurable



Mini Reduction

- **Goals**
 - **Reduce Mini size no bigger than the existing Micro**
 - ▲ AllEvents sizes are ~9KB/event for Mini, ~2kb/event for Micro
 - **Reduced Mini should function exactly as the Mini**
 - ▲ BetaMini executables should run without change on Reduced Minis
 - ▲ Produce **identical** results as reading the full Mini in **cache mode**
 - **Reduction should be easily configurable**
 - ▲ Allow customization for New Skims
- **Size is reduced in 2 ways**
 - **Reduce the # (list) of objects stored**
 - **Reduce the detail stored per object**



List Reduction

- Store only what's needed for a physics analysis (or set of analyses)
- 'User' provides the lists of BtaCandidates needed for an analysis via talkto module **BtaMiniListMerge**
 - BtaCandidateList set **"GoodTracksLoose"**
 - BtaCandidateList set **"MyGoodStars"**, ...
- All reco objects referenced by these candidates are placed on 'Reduced' lists
 - Daughter links are followed where necessary
 - Redundancy is compressed out
- Reduced Reco lists are persisted as Reduced Mini
 - Dedicated instance of loaders
- Composites are stored as references to daughters
 - See talk by G. Finocchiaro



Data Content Reduction

- Drop Svt + Dch unassigned hits
- Drop Drc hits and tracks
 - DrcPidInfo is persisted as part of PidInfoSummary
- Drop trigger data
 - Trigger **bits** are stored on the tag
- Keep PidInfoSummary for all track-based candidates
 - **Neutral pid is not kept**
- Trim 'Hit' data associated with Tracks and Clusters
 - Next slides



Track Data Content Reduction

- **Drop Individual HitOnTrk (HOT) data**
 - **TrkQual (+) HOT information is stored with tracks**
 - ▲ NSvt, NDch, ...
 - ▲ HOT data summary is packed into 8 bytes
 - **HOT storage configured via Loader**
 - ▲ A given loader instance stores either HOTS or Hot data summary
 - ▲ Same job can store streams with or without Hots
- **Store only those track fits explicitly referenced by selected BtaCandidates**
 - Store only those **mass hypos** given by BtaCandidate type
 - Store fits at **flight lengths** given by BtaCandidate point
 - OR together storage requests from selected BtaCandidates referencing a given track



Emc and Ifr Content Reduction

- **Store EmcCand and IfrAbs3D objects referenced by selected BtaCandidates as-is**
 - **No attempt to reduce these objects to numbers ala Micro**
 - ▲ Energy, 2nd Zernike moment, ...
 - **Properties are accessed as in the Mini**
- **Reduce the list of digi-level objects to those referenced by selected BtaCandidates**
 - Reduce Ifr1D list to those referenced by selected IfrAbs3Ds
 - Reduce EmcDigi list to those referenced by selected EmcCands



Reduced Mini Data Sizes

- Sizes don't include compression or overhead
- **Demonstration** selecting GoodTracksLoose + CalorClusterNeutral + GoodPhotonLoose + KsDefault + MyDstars +...

Kbytes/event	All	Svt	Dch	Trk	Drc	Emc	Ifr	Pid	Trg
AllEvents	7.6	0.4	0.5	2.1	1.6	2.0	0.2	0.3	0.3
AllEvents Reduced	1.8	0.0	0.0	0.6	0.0	0.8	0.1	0.2	0.0
IsMultiHadron	12.4	0.3	0.8	4.3	2.5	2.9	0.2	0.5	0.6
IsMultiHadron Reduced	3.2	0.0	0.0	1.3	0.0	1.3	0.1	0.4	0.0



Status and Conclusions

- Mini reduction is implemented, tested, and released
- Open Issues:
 - Is Emc + Ifr reduction strategy compatible with physics?
 - Can the analysis community agree on what BtaCandidate lists are needed to define the ALLEvents New Micro
 - Porting the Mini to Kanga
 - Interactive Mini Access

