



The LIGO I Science Run

Data & Computing Group Operations Plan

9th Meeting of the LIGO PAC

LIGO Livingston Observatory

Livingston, Louisiana

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Outline

- LIGO/LSC data analysis model
- Data & computing group functions, budgets



LIGO/LSC Data Analysis Model

- Now:
 - » Initial engineering runs starting to set the stage for how science, research is done
 - » Data being archived at Caltech in HPSS
 - » Access from archive according to LIGO Laboratory MOUs
 - » “Stress testing” of software and hardware systems - both LDAS and GDS/DAQS/CDS
 - » Initial data analyses focus on
 - sorting out commissioning issues,
 - understanding environment,
 - Calibrations, data conditioning, pre-processing



LIGO/LSC Data Analysis Model

- Near-term (2Q2001):
 - » LIGO science will focus on using engineering runs to extract meaningful first upper limits
 - » Organized around 4 upper limits papers using ~1 week of data in 2Q2001
 - » Opportunity to set current best upper limits on these classes of sources
 - » Provides a basis to "exercise" the LSC data analysis groups
 - » Provides a basis for future organization of the LIGO I Science Run search teams
 - groups will expand as interest grows in LIGO science.



LIGO/LSC Data Analysis Model

- LIGO I Science Run (2Q2002):
 - » Key astrophysical searches follow the LSC Data Analysis White Paper plan:
 - » Organized around teams, as in near-term upper limit studies
 - Open to all who are willing to work
 - » LIGO Lab LDAS resources to be used for searches will be shared among the teams
 - » LSC member institutional resources used by individual researchers
 - » *Longer term: establish 5 LIGO/LSC Tier 2 centers (“University Research Centers” or URCs) to provide additional computational, data distribution resources across collaboration*



LIGO/LSC Data Analysis Model

- Throughout Engineering & Science Runs, the Laboratory's Data & Computing Group fulfills the following roles:
 - » LIGO science, data analysis: scientific staff are actively engaged in the astrophysics searches
 - » Simulation & Modeling: detector support, data analysis
 - » Continuous management and movement of large volumes of data
 - » Maintaining pipeline analyses running, archive running
 - » Software maintenance/improvements/enhancements
 - » LSC support, visitors
 - » LIGO Laboratory-wide IT support



Data & Computing Group

Principal LDAS activities during operations

LDAS Staffing Plan

| Personnel | FTE | LIGO Science Run; Algorithm Perf. Mon | LIGO Science Run; HW Perf. Mon | LIGO Science Run; Data Archival | LIGO Science Run; Data Analysis & Research | Operations : DB Mgmt | Operations: Sys. Admin | SW Dev & Maint. |
|--------------------------------|-------------|---------------------------------------|--------------------------------|---------------------------------|--------------------------------------------|----------------------|------------------------|-----------------|
| Graduate Student | 2.0 | | | | 2 | | | |
| Post Doctoral Researcher | 3.0 | 0.45 | 0.33 | 0.25 | 1.97 | | | |
| Sci. | 3.8 | 1.38 | 0.2 | 0.45 | 1.24 | | | 0.53 |
| Sw. Eng | 3.8 | 1.42 | | | | | | 2.38 |
| Contract SW Eng. | 1.0 | | | | | | | 1 |
| DB Admin | 1.0 | | | 0.5 | | 0.5 | | |
| HPSS Admin | 1.0 | | | 0.5 | | | 0.5 | |
| LDAS-SysAdmin | 1.0 | | | | | | 1 | |
| <i>CIT Totals -></i> | 16.6 | 3.25 | 0.53 | 1.7 | 5.21 | 0.5 | 1.5 | 3.91 |
| LHO Sci* | 1.0 | 0.2 | 0.2 | 0.2 | 0.2 | | | 0.2 |
| LLO Sci* | 1.0 | 0.2 | 0.2 | 0.2 | 0.2 | | | 0.2 |
| LIGO Lab Totals -> | 18.6 | 3.65 | 0.93 | 2.1 | 5.61 | 0.5 | 1.9 | 3.91 |
| Personnel Classifications | Students | | | | 2 | | | |
| | Post Docs | 0.45 | 0.33 | 0.25 | 1.97 | | | |
| | Scientists | 1.38 | 0.2 | 0.45 | 1.24 | | | 0.53 |
| | SW Eng. | 1.42 | | | | | | 3.38 |
| | SysAdmin | | | 1 | | 0.5 | 1.5 | |

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*NOTE: LHO and LLO personnel are in the budgetary proposals from the respective observatories

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Data & Computing Group

Principal Modeling & Simulation activities during operations

Modeling & Simulation Staffing Plan

| Personnel | FTE | Code environ. | Code environ. | Code environ. | Code environ. | Detector | Data |
|--------------------------------|---------------|-------------------------------|---------------------------------------|----------------------------------------|------------------------------|----------------------------|------------------------|
| | | Developme nt: Archite ctue | Developme nt: EM Fields, Optics | Developme nt: Mechanical systems | Developme nt: GUIDevelop. | Per form ance Mode ling | Analysis Simulation |
| Graduat e Student | 2.0 | | | | | 1 | 1 |
| Post Doct oral Res ea rcher | 1.0 | | | 0.5 | | 0.5 | |
| Sci. | 2.0 | 0.5 | 0.5 | | 0.25 | 0.5 | 0.25 |
| Sw. Eng | 1.0 | 0.75 | | 0.25 | | | |
| Contrac t SW Eng. | 1.0 | | | | 1 | | |
| <i>CIT Totals -></i> | 7.0 | 1.25 | 0.5 | 0.75 | 1.25 | 2 | 1.25 |
| Personnel | Students | | | | | <i>1</i> | <i>1</i> |
| Classi fica tions | Post Doc s | | | <i>0.5</i> | | <i>0.5</i> | |
| | Scie nt ist s | <i>0.5</i> | <i>0.5</i> | | <i>0.25</i> | <i>0.5</i> | <i>0.25</i> |
| | SW Eng. | <i>0.75</i> | | <i>0.25</i> | <i>1</i> | | |



Data & Computing Group

Principal General Computing activities during operations

General Computing Staffing Plan

| Personnel | | FTE | Server & Data Systems | Desktop Workstations | LAN & WAN Administration | Telecommunications Administration | Web & DB Administration |
|------------------------|------------|-------------|-----------------------|----------------------|--------------------------|-----------------------------------|-------------------------|
| Student Ass t. | | 0.40 | | 0.4 | | | |
| www , DB Adm in | | 0.50 | | | | | 0.5 |
| Sci. | | 0.10 | | | 0.1 | | |
| Sr. Sys. Adm in | | 1.00 | 0.2 | 0.15 | 0.3 | 0.35 | |
| Ass t. Sys. Adm in | | 1.00 | 0.3 | 0.6 | 0.1 | | |
| Contra ct Sys. Adm in. | | 1.00 | 0.25 | 0.75 | | | |
| CIT Totals -> | | 4.00 | 0.75 | 1.9 | 0.5 | 0.35 | 0.5 |
| MIT Sys. Adm in* | | 1.00 | 0.3 | 0.6 | 0.1 | | |
| LHO Sys. Adm in.* | | 1.25 | 0.3 | 0.6 | 0.1 | 0.13 | 0.12 |
| LLO Sys. Adm in.* | | 1.25 | 0.3 | 0.6 | 0.1 | 0.13 | 0.12 |
| LIGO Lab Totals -> | | 7.50 | 1.35 | 3.1 | 0.7 | 0.48 | 0.62 |
| Personnel | Students | | | 0.4 | | | |
| Classi fica tions | DB Adm in. | | | | | | 0.5 |
| | Sci. | | | | 0.1 | | |
| | SysAdmin | | 0.75 | 1.5 | 0.4 | 0.35 | |

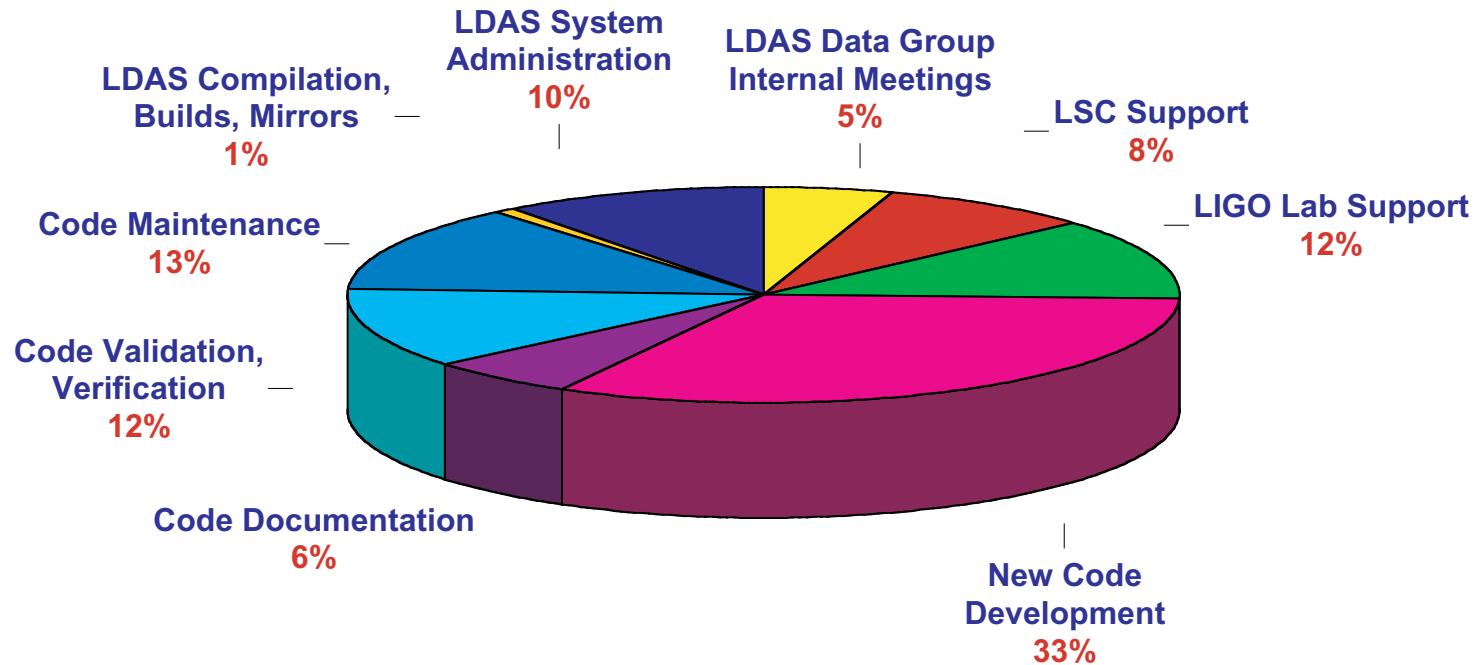
*NOTE: MIT, LHO, and LLO personnel are in the budgetary proposals from the respective sites
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LDAS Operations

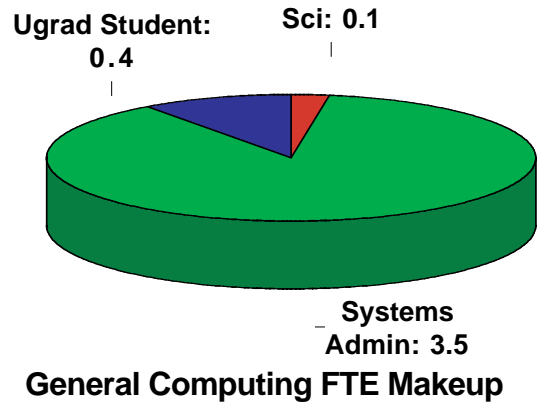
Statistics derived from actual experience

Breakdown of LDAS Workforce Activities



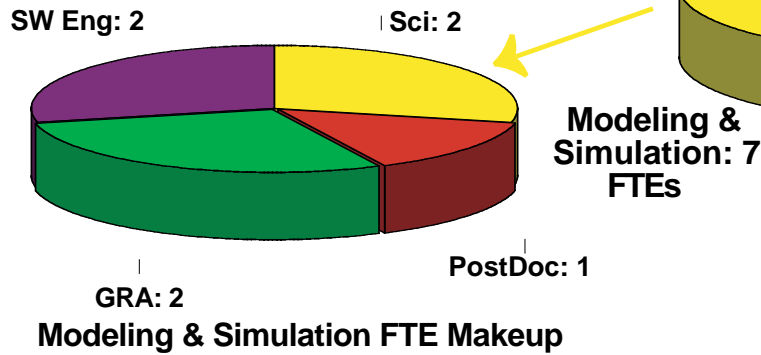


Breakdown of FTEs in Data & Computing Group



General Computing: 4 FTEs

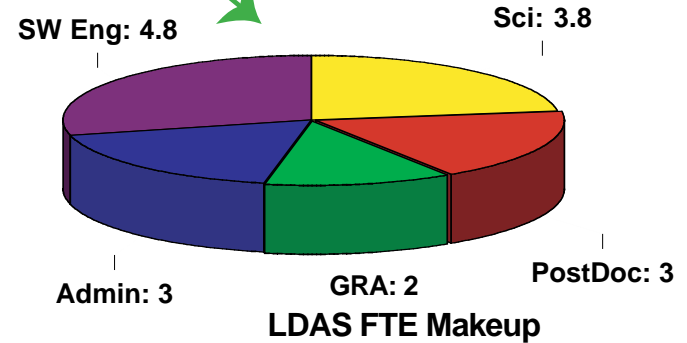
* MIT, LHO, and LLO have local General Computing staff



Modeling & Simulation: 7 FTEs

LDAS Operations: 16.6 FTEs

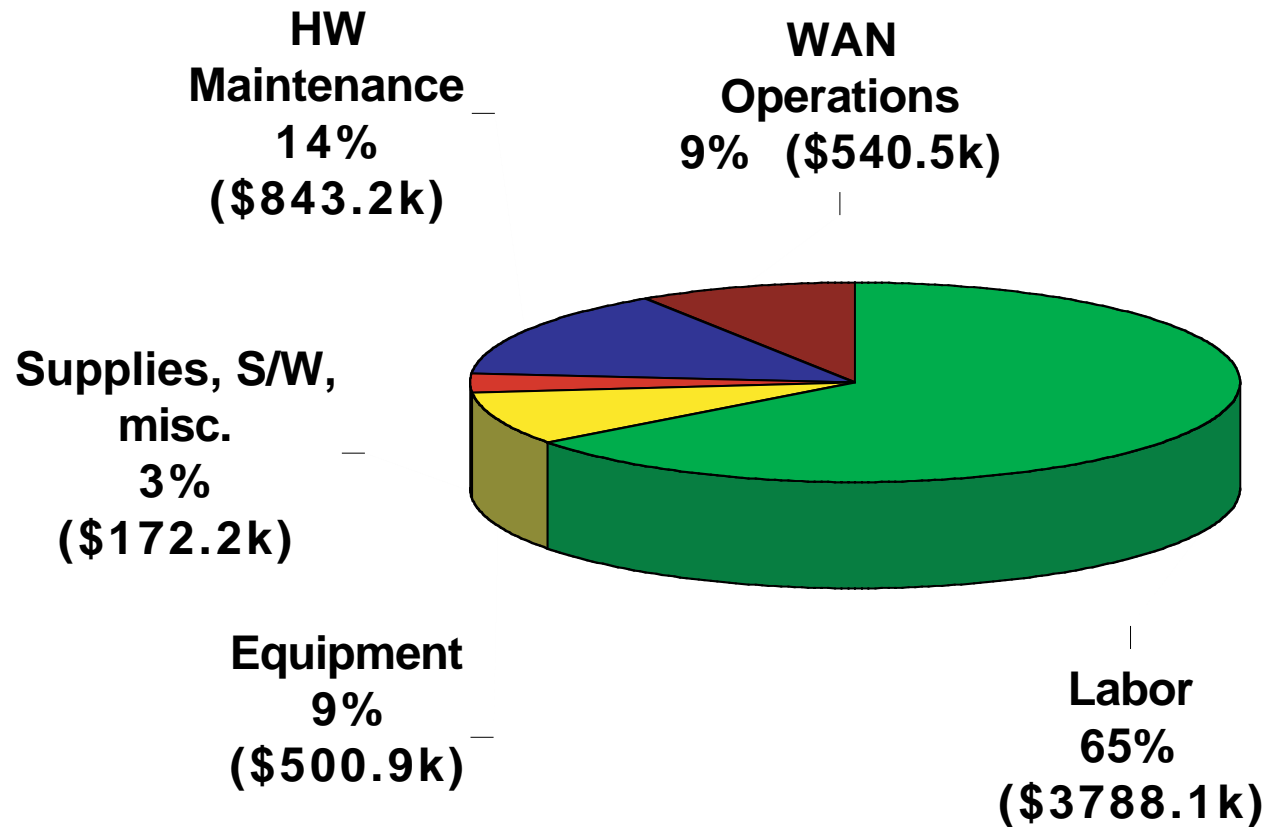
* LHO, and LLO have local LDAS staff





Data and Computing Budget Breakdown

Data & Computing Group FY2002 Budget: \$5844k



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LDAS Operations Budget

Hardware Support

From Procurement Plan C90755-A

| Hardware Class | Procurement Expense | Maintenance @ 30%/yr | | | FY2001Q4-FY2004Q1 Maintenance | FY2001Q4-FY2004Q1 Maintenance |
|---------------------------------------------|----------------------------|-----------------------------|-----------------|-----------------|--------------------------------------|--------------------------------------|
| | | | \$/yr | \$/qtr | | |
| HPSS | \$1428.0K | \$428.4K | | | | |
| Servers | \$272.0K | \$81.6K | | | | |
| Switches | \$163.0K | \$48.9K | | | | |
| HW RAID, Small Robots | \$735.0K | \$220.5K | \$779.4K | \$194.9K | \$194.9K | \$107.1K |
| | | Maintenance @ 15%/yr | | | FY2001Q4-FY2004Q1 Equipment | FY2001Q4-FY2004Q1 Equipment |
| Workststion s, small switches, disks | \$1387.0K | \$208.1K | \$208.1K | \$52.0K | \$52.0K | \$139.8K |
| Totals-> | \$3985.0K | \$987.5K | \$987.5K | \$246.9K | \$246.9K | \$246.9K |

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