Local ALADIN&HIRLAM Operational Suite

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This paper was done, based on the question-form which has been sent to all of the ALADIN and HIRLAM correspondents, with the aim to obtain more detail information about the organization of the local operational suite. The result was also presented during the last ALADIN-HIRLAM workshop in Budapest.

1. Question-form - Local ALADIN&HIRLAM Scripts, ALADIN&HIRLAM Operation Suite and an Active Standby Operation

This form was compiled as 16 simple questions set into 3 main subjects, with expectable answer as possibility choice.

- Operational environment
- Modularity and flexibility
- Centralize/decentralize hardware
- Queuing system
- Hardware show
-
- Active standby operation, monitoring and maintenance
- Continual supervision of operational suite
- Method of monitoring
- Communication facility for monitoring
-
- Active standby operation and monitoring
- Staff
- Cooperation
- LBC data
- Hardware reliability
- Trouble
- Failure

2. The hardware show

This table shows hardware platform used for model execution, the queuing system and the hardware used for post-processing.

Country	HPCS Platform	Queuing system	Post-processing
Austria	SGI	none	SGI, SUN
Belgium	SGI	PBS Pro	SGI
Bulgaria	Linux PC	none	Linux PC
Croatia	SGI	Open PBS	Linux PC
Czech Republic	NEC	NQS	Linux server
Denmark	NEC/SX6	NQS II	NEC/SX6
Finland	SGI Altix BX2	none	SGI Altix BX2
France	Fujitsu	NQS	Fujitsu, HP
Hungary	IBM	LoadLeveler	IBM
Ireland	IBM RS/6000	LoadLeveler	IBM RS/6000
Morocco	IBM	LoadLeveler	IBM
Netherlands	Sun Fire 15K	none	Sun Fire 15K
Norway	SGI Origin 3800	LSF	Intel Xeon
Poland	SGI	yes	SGI + Linux server
Portugal	DEC	none	DEC
Romania	SUN	none	SUN/DEC
Slovakia	IBM	LoadLeveler WLM, vsrac	IBM/DEC
Slovenia	Linux cluster	FIFO scheduler	Linux cluster
Spain	CRAY X1E	PBS	CRAY X1E
Sweden	Linux Cluster	PBS	Alpha Server 4000
Tunisia	IBM	yes	IBM

3. Operational environment

This item should answer the question of what is main features of the local operational suite from a programming point of view, generally the operational environment.

- independent scripts and programs executing by system scheduler (cron) 8 3
- the monitor scheduler tool based on a sequential scripts (shell, perl) 1 1
- the monitor scheduler tool based on a modular scripts with checking of dependencies on the independent modules 2
- the commercial monitor scheduler software (e.g. SMS) covered the scripts 2 2
- the monitor scheduler software written in house based on high-level language 1

4. Operational suite

The ALADIN operational suite is generally located on HPCS (or the auxiliary server is used), the system cron is used for submitting a start script through QS if available, the scheduler SMS (Supervisor Monitor Scheduler) and PBS (Portable Batch System) are used and so is a monitoring system based on http. The Nagios can be optionally used as an open source host, service and network monitoring program and the Ganglia as a scalable distributed monitoring system for high-performance computing systems such as clusters and Grids.

5. Modularity and flexibility

The answer for question how any operational suite is well arranged. It would be useful to know what should be your estimation demand factor for modification of local operational "script"? The task is to make some modification into local operation suite based on upgrading configuration 001 from 48 to 72 hours and to produce a simple graphical output for precipitation. The available time for this task is 6 hours. There is a scale of time tresholds for this task. In fact, the answers are quite optimistic.

• very easy (1-2hours)	5	2
• quite easy (3 hours)	7	4
• difficult (5 hours)	1	
• very difficult (6 hours and more)	1	1
• only after through analysis (1-2 days)		
• practically impossible without rewriting operational suite afresh		

6. The active standby operation, monitoring and maintenance

Do you use some kind of the active standby operation for the operational suite with periodical procedure of changing the responsible staff?

• yes	6	4
• no	7	3
• yes/no	1	

yes/no - the warning message is sent to person with no obligation to act

7. The continual supervision of operational suite

• 24x7 (including holidays)	5	5
• 24x5 (only working days)		
• 8x5 (only in working time)	8*	
• 24x6	1	
• no regular operation supervision	2	

* + depending on the weather situation

8. The method of monitoring

Is there a method of monitoring active or passive mode? An active monitoring means that a status of execution of a suite (or status in case of fault) is sent to the responsible person (SMS, e-mail, notification). A passive monitoring means that the responsible person checks the status of the suite at periodical time.

• active monitoring based on warning message (e.g. SMS, e-mail)	8	5
• no active monitoring based on periodic check of operational status	4	2
• service mission on the user's (customer's) demand	2	
no active monitoring and no periodic check	1	
checking by computer operators	1	2

9. The communication facility for monitoring

The informants indicated more options in this case, so the simple sum of answers do not tally. The surprise comes from the small number of really mobile communication equipment usie for monitoring. A personal invitation on site is still more popular.

• phone (voice)-interactive comm. with technical and forecaster staff	4	5
• phone line (modem)-interactive access	4	3
• mobile phone (voice)-interactive communication with technical and forecaster staff	6	3
• notebook (with GPRS/EDGE modem)	2	
• PocketPC, smart phone (with GPRS/EDGE modem)	2	
• personal intervention on site	9	1

10. The Active standby operation and monitoring

The monitoring based on willingness is more or less equal to official one.

• spontaneous with exclusion of profit	5	3
• officially as office of profit	5	2

- officially with compensation in time
- a special service contract arrangement

11. The NWP staff

There is an overview from NWP staff responsible for operational suite ordered by the number of people in active standby operation. The statistic is not very precise because there is probably a mix of available people during working time and responsible people for current time.

• during working time	(out of working time)
1	(0)
1	(0)
1	(0)
2	(0)
2	(0 to 2)
1	(1)

1	(1 IT operator)
1	(1 IT operator)
1 to 5	(1)
1	(1)
2	(2)
2	(2)
2	(2)
2+1	(1)
2-3	(1-2)
3	(1)
8	(1 person in periodical shift)
4	(1)
5-6	(1-2)
2+1+1	(2+1+1)
4+4	(4+4)

12. The cooperation

The cooperation with another technical section (department) in the field of maintenance and supervising system.

The mostly cooperation between application, system environment and communication channel is used.

• only NWP	3	
• NWP + LAN/WAN maintenance	2	
• NWP + LAN/WAN maintenance + system administrator	7	6
• NWP + outsourcing + system administrator	2	1
• NWP + LAN/WAN maintenance + outsourcing		
• NWP + outsourcing		

13. The LBC data

The fetching of LBC is done mainly through Internet. Very often, both connection are used simultaneously by means of intelligent fetching procedure for elimination Internet prime time effect (ALADIN case).

	the main connection		the backup	
• Internet	9	2	3	2
• RETIM	0		4	
• RMDCN	2	5	3	2
• local data	1		1	
• leased line to TLS	1		0	
• Messir-Comm1		1		
• no backup	x		2	3

Internet&RMDCN	simultaneously
Internet&Messir-Comm	
Internet&RETIM	
Internet&Internet (another provider)	
RMDCN (ISDN)	on demand

There is a table for error rate for transfer LBC data via Internet and RETIM in SHMI suite during the last 10 months (terms for the false event are "no data" or "delay more than 2 hours") . The total error

rate means that data are missing from the both sources all at once. As you can see (e.g. for 06:00 run) the error rate is quite high for both sources (8,7 and 6,3), but thanks to backup and "small probability of event at same time" the total error rate is quite acceptable (1,5). This is only an example which shows that backup is really needful.

	Internet	RETIM	total error rate
00:00	2,3%	3,3%	0%
06:00	8,7%	6,3%	1,5%
12:00	1,7%	4,0%	0,7%
18:00	4,8%	7,1%	0,8%

14. Hardware reliability

A maintenance agreement for the High Performance Computing System.

- yes 11 7
- no 3 0

15. The trouble

The “bottle neck” for the local operational suite.

- 24,7% 15,1% receiving LBC data
- 17,4% 32,0% operational system, parallel environment, queuing system
- 14,7% 21,7% hardware
- 13,0% 7,5% model execution
- 12,1% 9,5% archiving
- 10,4% 4,7% dissemination of products to the customers and the end users
- 7,7% 9,5% post-processing

16. The failure

How many failures do you have during one month?

The question is divided into 3 parts; the first one, is done by severity level, the second one, by intervention time and the last one, by source of problem.

The lesser failure is defined as a delay of less than 2 hours or an error in some low priority post-processing. The severe failure is defined as a necessity of intervention by operational staff. The fatal failure is simply no result due to missing LBC or power supply. The number of events depends on intervention assessments and consequences. This is the reason for 2 categories of answers; the second one reflects higher risk assessment in case of no intervention for minor event.

In case of two daily runs (00:00 and 12:00 UTC), the operational suite usually runs after working time when, more often than not, minor events are likely to occur, due to lack of human risk assessment.

Generally, the initialization of the operational suite is connected with troubles concerning customization and functionality of queuing system and parallel environment. Finally, the users is able to find the right path through this environment, the problem should sprinng up again, in case of upgrade and modification of local operational suite.

- minor (delay less than 2 hours) 1 – 4 (10 - 30) 1 - 2
- severe (intervention of operational staff) 0 – 2 (10) 0 - 1
- fatal (no result) 1 – 5/year 1 – 2/year
  (missing of LBCs or power supply)

- during working time 35%

- after working time 65%
  (operational suite is usually running after working time very often the minor failure becomes severe after working time)

- hardware failures 15%
- software failures 85%
  (the most of the errors are usually due to software failures and queuing system, the hardware problem is rare)

17. Conclusion (ALADIN)

What is the portrait of common ALADIN operational suite at the present time?

- The powerful computer (auxiliary server – historical, technical, safety reason)
- The LBC are getting through Internet with a backup connection
- The operation is based on script(s) initiated by system cron through a queuing system
- Scheduling by a batch system (SMS, PBS, in house soft)
- Monitoring based on web GUI with warning option
- A NWP team take care about operational suite (optionally or officially)
- The monitoring remote access is done from various palette of communication devices, the personal intervention on site is often used
- The cooperation with the LAN and system administrator support is preferable
- The reliability of hardware is warranted by maintenance agreement
- The fetching of LBC, customization and using a given queuing system and parallel environment are sources of the most frequent troubles

18. Conclusion (HIRLAM)

What is the portrait of common HIRLAM operational suite at the present time?

- The powerful computer (auxiliary server used for post-processing in two cases)
- The LBC are getting through RMDCN with a Internet backup
- The operation is based on script(s) initiated by system cron through a queuing system
- A NWP team take care about operational suite (cooperation with IT)
- The monitoring remote access is done by internet connection or based on phone (voice) call
- The cooperation with the LAN and system administrator support is preferable
- The reliability of hardware is warranted by maintenance agreement
- The customization and using a given queuing system and parallel environment are sources of the most frequent troubles