



D2.3 Customer Feedback Measurement II Version 1.7

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Author	JM Morel (Teratec)
Contributor(s)	D. Loureiro (INRIA)
Reviewer	C. Terboven (RWTH Aachen)
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Change Log

Version	Author	Description of Change
V1.4	JM Morel David Loureiro	Initial Version
V1.6	JM Morel David Loureiro	Minor fixes before internal review
V1.7	JM Morel David Loureiro	Final version incorporating changes proposed by internal reviewer Christian Terboven (RWTH)



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Executive Summary

This deliverable summarizes the findings of the work package “Customer Advocacy” during the second year of the project. It also presents the actual suggestions made by the Customer Advocate to the internal operational management meetings of the project, and describes the User Forum Meetings that have been organized during this second year in the framework of HPC workshops or conference in which the POP project has been presented.

1. Introduction

As stated in the proposal *“The Customer Advocacy is a way of ensuring that the activities of the project are really performed to the full satisfaction of the customers. POP will deliver value to application developers, infrastructure operators and scientific users of parallel applications. [...] The Customer Advocacy will gather their feedback and make sure they play an important role in driving the operations of the Centre of Excellence. To this end, The Customer Advocacy will carry out a process for measuring Customer Satisfaction and will organise events where customers can freely express their feedback and suggestions.”*

To this end, several actions have been conducted. As mentioned in D2.2, during the first year of the project we:

- designed various questionnaires in order to get feedback from the end-users for each specific action carried out by POP experts (Audit of code, Performance Plan, Proof-of-Concept), about the Performance Analysis Tools, and about the global ROI (Return on Investment measured as the ratio of the benefits resulting from the performance improvement of the application to the cost of the code optimization),
- selected SurveyMonkey, a survey tool, to implement these questionnaires and get the feedback from end-users,
- conducted phone interviews with most POP service end-users for getting more details about their experience of POP services, get their agreement on the interview report, and identify customer quotes,
- created a set of facilities to streamline the interaction with the users and a wiki table to:
 - follow-up the progress of these surveys,
 - share the results with other members of the Project (the POP experts who deliver the services, the people in charge of Dissemination, the Management, ...).

Building on these activities and taking the positive feedback and experiences gathered into account, during the second year we kept:



- following up the status of the POP services, soliciting end-users to fill in appropriate questionnaires as soon as the service they have asked for was finished (i.e. once they have received from the POP expert the corresponding Audit Report, Performance Plan, or PoC Findings),
- interviewing customers by phone to better understand how much they appreciated the POP services, to know about their intention to solicit additional services, to ask them if they would accept to pay for such services in the future, etc.
- compiling and synthesizing the feedback from the questionnaires and from the interviews, uploading these information on the POP Wiki, and reporting regularly to the Operational Management meetings (monthly audio conferences, General Assemblies, ...).

Besides, we continued to organize user forum meetings in the framework of international conferences or workshops. During this second year, we organized two user forums, each one with several customers who gave testimony of their satisfaction with the POP services they benefited from:

- A User Forum in the framework of the HPC Summit Week in Barcelona, 15-19 May 2017 with about 25 participants.
- A BoF session at ISC'17 (similar to previous year) with over 20 participants.

More details about these activities are given in the following sections.

2. Customer Survey, setup and feedback

2.1 Customer feedback through surveys

As described in the deliverable D2.2, the Customer Advocacy uses SurveyMonkey¹, a web-based service allowing the creation of surveys in a pretty efficient way and providing an interesting administration interface with graphs and exportations capabilities in various formats for external statistics or publication.

In order to get the customer feedback efficiently, the following surveys have been designed during the first year and slightly updated during the second year, when needed. Based on the feedback and the analysis of the filled out questionnaires we received, the updates were made either to make a question more precise, or to add a new question.

- Three questionnaires related to POP services (one for each type of service):
 - Performance Audit: https://fr.surveymonkey.com/r/F1_Report
 - Performance Plan: https://fr.surveymonkey.com/r/F2_Plan

¹ https://fr.surveymonkey.net/?ut_source=header



- Proof Of Concept: https://fr.surveymonkey.com/r/F3_PoC
- One questionnaire regarding Performance tools (for users who are using the performance analysis tools by themselves to measure the performance improvement resulting from code modifications): https://fr.surveymonkey.com/r/F4_Perf-Tools
- One regarding the evaluation of the performance improvement and of the resulting gains in order to measure the global return on investment: https://fr.surveymonkey.com/r/F5_Perf-gains

2.2 Customer feedback

Each time an Audit, a Performance Plan or a Proof-of-Concept is finished, the corresponding survey is sent to the end-user who benefited from this POP service. Once the survey has been filled out by the end-user, the compilation of the answers is sent back to the end-user, and, in most cases, an interview by phone is organized to get more details.

The answers to the surveys and the interview minutes are also sent to the corresponding POP experts in order to give them feedback and insights on how the customer perceived the service that he or she has been provided with.

Up to this point, there is a very good return rate of the completed surveys (~84%, 51/60 Audits; 10/12 PP; 5/6 PoC). This rate which covers years 1 and 2 has significantly progressed during the second year as it was 78% for year 1. This high response rate is made possible by two actions: first, the questionnaires regarding the audit, the performance plan, and the proof-of-concept have been made quite straightforward to complete, and second, nonresponding end-users are systematically and rapidly called back and kindly reminded of the completion of the survey.

As of today (Sept. 5, 2017), in total, 79 answers have been gathered: 51 regarding audit reports, 10 for Performance Plan, 5 for Proof-of-Concept, 7 for the Performance Tools Evaluation, and 6 for the assessment of Performance improvement.

The data summaries for the Analysis Report, the Performance Plan and the Proof-of-Concept can be respectively found in the annex 1, 2 and 3.

If we take a look at the answers related to the general perception of POP experts and their reports for the Audit service, the feedback is very good:



- A vast majority (90%) of the end users found the Audit Report Clear and easy to understand (see Figure 1):

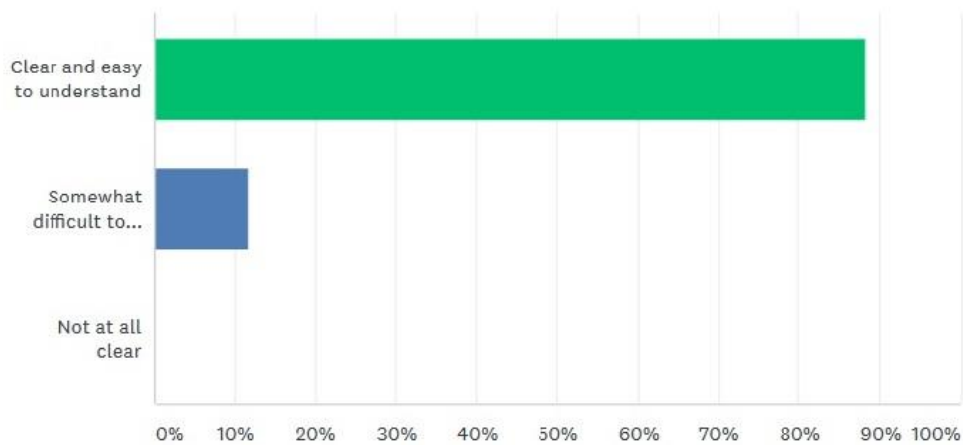


Figure 1 How did you find the Performance Analysis Report?

- The end users found that the POP experts were very or extremely responsive when questioned about the Audit (see Figure 2):
- The customers found that the answers of the POP experts to their questions were from good to excellent (see Figure 3):

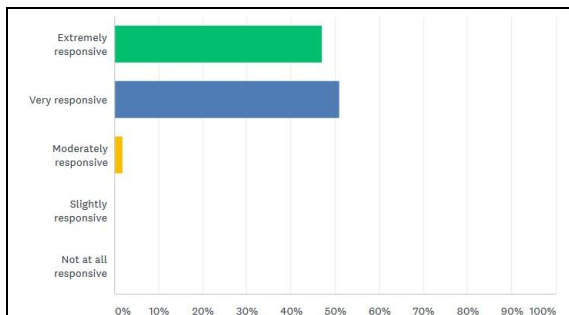


Figure 2 How responsive have the POP experts been to your questions or concerns about the analysis and the report?

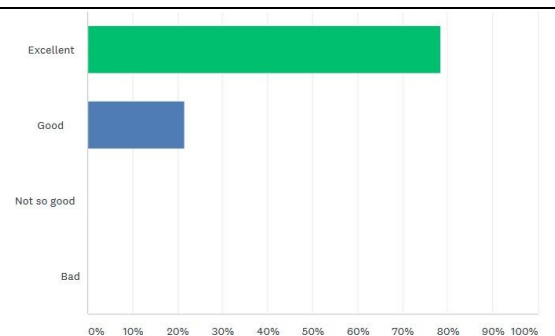


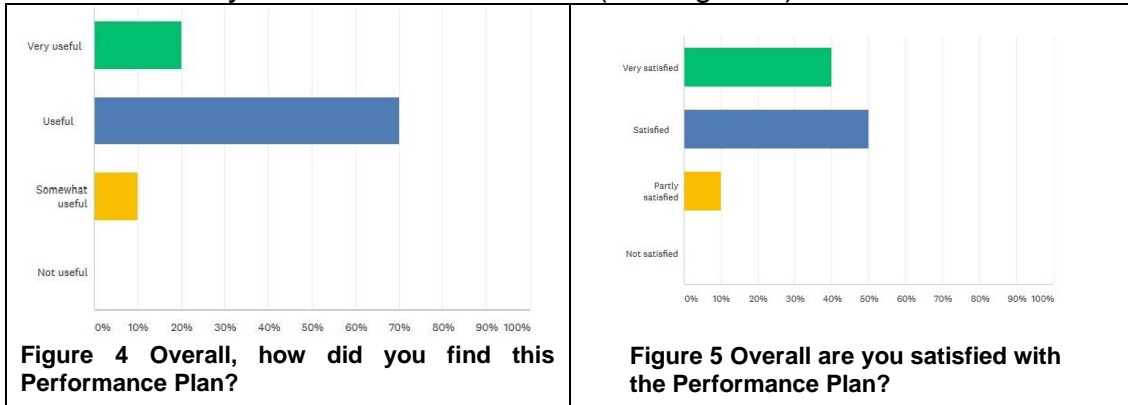
Figure 3 What was the quality of their answers?

- When asked if they need an additional service (Performance Plan or Proof-of-Concept), 65% answer 'Yes' (50% declare to be ready to apply for a PP, 15% for a PoC). In fact, they often wait some time before applying, either because they want to make a first set of modifications before doing a more detailed performance analysis or because they get busy by more urgent tasks. Anyway, **this demonstrates that there are some potential end-user requests to expect as future service work.**
- Also, one out of four customers states to have other applications to audit. **This means more potential requests.**
- However, when asked about the readiness of their organisation to pay, only 20% answer positively, possibly because they don't want to (or cannot) commit on behalf of their organisation.

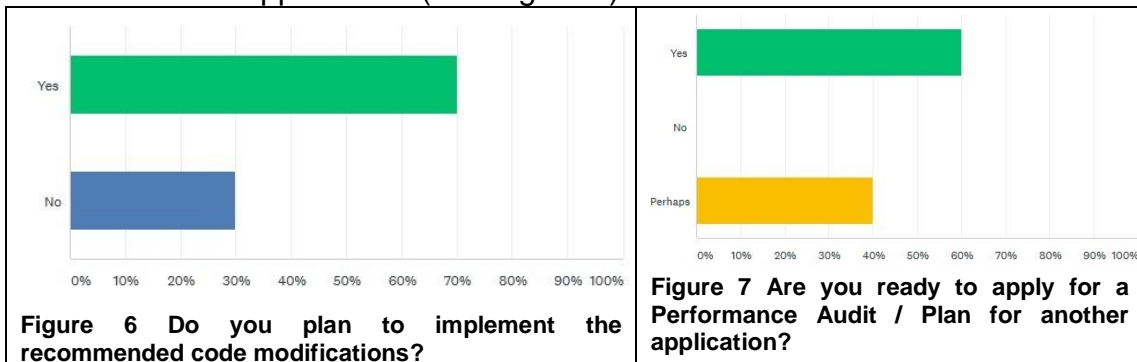


The feedback regarding the Performance Plan and Proof-Of-Concept services is also very encouraging:

- Most end-users who benefited from a Performance Plan found it ‘very useful’ or ‘useful’ (see **Erreur ! Source du renvoi introuvable.**) and are ‘Very satisfied’ or ‘Satisfied’ (see Figure 5):



- Most of them see an interest in implementing the recommended modifications (see Figure 6) and are ready to apply for similar service on other applications (see Figure 7):



- However, they are hesitant when asked about possible payment:

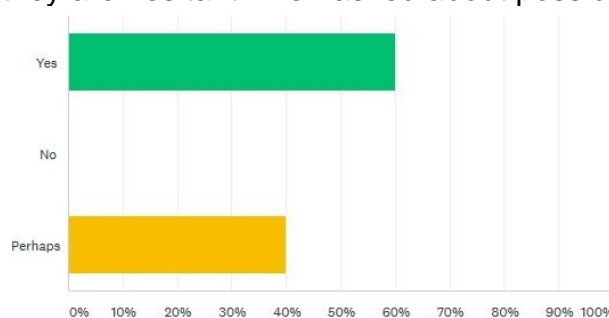


Figure 8 In the future, would you be ready to pay for such a service?

The feedback also includes interesting remarks like the following ones:

“The Report is well structured and showed me different points where to optimize my code. Some of them were clear to me but others were quite surprising, but helped me a lot to further improve the performance of our application”.



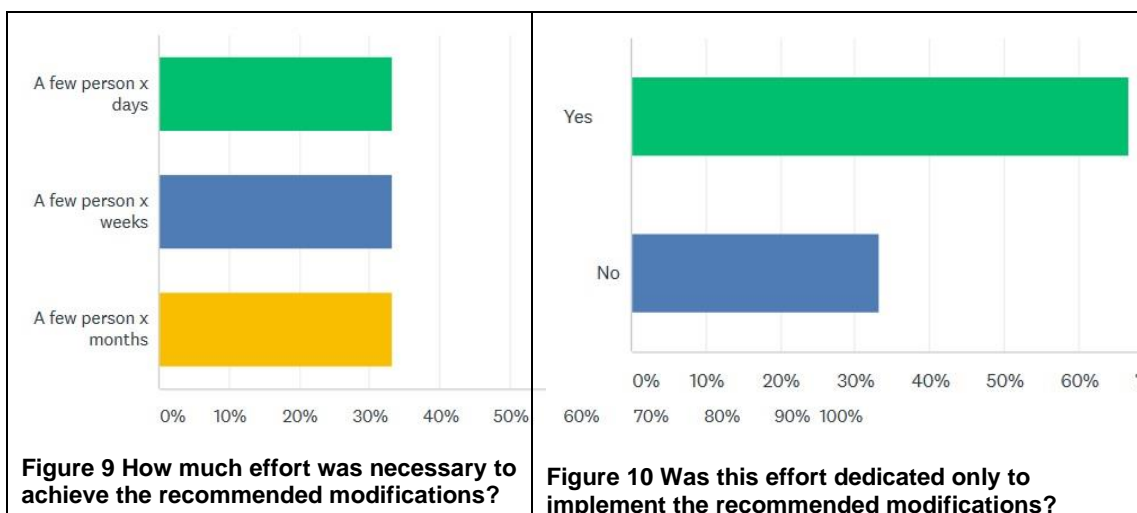
This clearly shows that while the user was aware of some problems, the audit enabled him to discover a few others he did not suspect.

- The POP audits help to identify problems in many aspects, such as:
 - Inefficient use of simultaneous threads
 - Lack of (or inefficient) use of vectorization
 - Inefficient use of memory
 - Inefficient communications (MPI, I/O, ...)
 - Redundant operations
 - Inefficient allocation strategy
 - Load imbalances
- Two users out of three would like to get training, especially in performance analysis which clearly shows their intent to better understand how to monitor the performance of their application as they evolve their code or have to run it on new architectures.

The feedback from end-users having benefited from a PoC service is quite similar to that obtained regarding the Performance Plan: in short, all of them found it very useful or useful and appreciated the responsiveness of the POP experts. 80% declared themselves ready to implement the recommended modifications and asked for training to monitor the performance improvement obtained when they evolve their code. However, many of them keep hesitant about possible payment.

We also got some feedback about the effort spent to modify the code and the resulting gain in performance. First, it appears that the time spent to modify the code varies from a few days for to a few months (see Figure 9), and one out of three end users evolves the application and implements the recommended modifications at the same time (See

Figure 10).



The second remark is that most of them (83%) do use the Performance tools to analyze the performance of the new version of their code. This means that,



thanks to POP experts, they learn how to use these tools and can now monitor the performance of their code as they modify it.

Regarding the observed performance gain, we got encouraging results:

Performance gain	Main results	Nb of run per day	Nb of people using this application	Added value
20% overall, 50% for the given module	Better scalability	Many times	Thousands	More competitive Faster Time-to-Solution
50-75%	Performance gain Possibility to treat larger problems	8	Several	More competitive Faster Time-to-Solution Enable to better explore the parameter space and test all possible variants
12%	Performance gain Better Scalability	5	A few	Faster Time-to-Solution
Up to 62 %	Better Scalability Possibility to treat larger problems	5	Several	Less energy consumption Faster Time-to-Solution Enable to better explore the parameter space and test all possible variants
6 - 47 %	Better scalability Possibility to treat larger problems	5	A few	Faster Time-to-Solution Enable to better explore the parameter space and test all possible variants
15%	Better scalability Possibility to better exploit new architectures		Several	Being more competitive

Also interesting is the fact that most customers realize that the code modifications not only improve the performance and the scalability of their application but also enable them to treat larger problems and/or better exploit new architectures (mixing multi- and many-core servers).

However, the critical answers about the total value gained per year compared to the cost of effort spent to audit and improve the application are often



incomplete. Hopefully some customers did make serious estimates and gave some encouraging figures ranging from 1.33 to 10.

2.3 Interviews

In order to get a deeper understanding of the customer experience, several scripts for interviews have been written, each one dedicated to a type of service (Audit, Performance Plan and Proof of Concept)

35 services have been the subject of interviews. All the customers have been very receptive to the action (only three customers refused to get interviewed).

Those interviews have been designed to get more feedback from the customers regarding the context of the POP services, how the end-users learned about POP, or any further advice they could provide regarding the improvement of the services.

The vast majority of interviewed customers knew about POP through contacts with the POP team. This means that the communication performed by the project has been efficient.

The majority of the POP customers being application developers, most of them could help setup and run the analyses without major problem.

Moreover, almost all the analyses were performed in the same context as the production one or at least in a similar context, while the input data were real production data for a vast majority or representative for others.

All of the customers interviewed found that the POP services were performed in a reasonable time.

All the customers were very satisfied with the report they got at the end of the performance analyses with the addition that some of them had to ask for additional information in order to get a complete understanding of all the figures and graphs.

Most of the customers were ok with the publication of the reports, some of them were only asking for some time in order to validate with colleagues, co-authors or superiors (only three customers refused to have their audit report published).

All the customers stated, with no exception, that they would recommend POP to other people.

The interviews were also a good opportunity to some direct feedback from the customers. The major advice to POP for them was clearly to improve the communication with several points of synchronization during the performance analyses (at the beginning, at least one during the analysis in order to get some feedback and one at the end) with Face-to-Face meeting, if possible. Some customers were also quite happy with their report because they had the possibility to review it during its writing, allowing them to get a crystal-clear comprehension of its content but also to get all the information they need.



3. Compilation of remarks and quotes from customers

We have got a pretty good set of remarks and quotes from customers. The table below contains the most interesting ones.

POP_AR_3	The POP experts did a great job during the performance audit. They identified the main problems thereby allowing the development team to understand the reasons behind some of these bottlenecks.
POP_AR_5 POP_PP_01 POP_PoCR_1	The POP services helped us improve the efficiency and the scalability of our codes and more specifically for the non-trivial cases (when a lot of options are used). The team behind the codes never had time to take a closer look at complex test cases. The fact that the POP team was available to help them on the subject was a very good opportunity.
POP_AR_6	Thanks to the audit, we are now able to do much larger simulation (before we were able to simulate 1 million particles and now more than 60 millions).
POP_AR_8	This audit allowed us to identify the problems of the code, where to optimize it and thus put forward the performances of the machines that will run this code.
POP_AR_9	The major impact could be an improvement of the performance by a factor of 2 of the computation time. If the performance analysis can reduce the computation time and the energy consumption, this would be interesting for the end users.
POP_AR_10	If the customer is not an expert, such an audit can be of great value.
POP_AR_13	The major impact of POP was that with more performance, we can be better than the competition when run on customer desktop computer. And with better performance we hope to sell more licenses.
POP_AR_18	This audit helped us to realize that our code was close to the optimality and it also helped prepare input models for a large simulation we have to perform in a project starting in the near future.
POP_AR_19	The audit helped us to reach more rapidly the point where we wanted to go.
POP_AR_20 POP_PoCR_3	Thanks to POP experts' knowhow, which is missing in our organization, we could carry on the parallelization of our code.
POP_AR_21	The major impact (<i>of the POP Audit</i>), was that we could get a rather detailed look at the code, something we don't often do.
POP_AR_24	The POP experts used our performance analysis tool on parts



	of the code (<i>that</i>) had not been analyzed before.
POP_AR_26	Those tools can help us to see how the performance can be deteriorated and if it is a major problem to address. This type of report is thus a good way to highlight the problems to solve.
POP_AR_29	The next version of the software will be guided by the output of the audit.
POP_AR_30	The balance of the time spent in each routine was not clear before the audit. And with the audit this has been clearly identified. The routines where most of the time is spent will probably be rewritten. They now know where the slowdown was coming from.
POP_AR_32	The major impact of the audit was a clear insight into the bottlenecks of the code, mainly memory bounds problems. This audit allowed our team to know where to focus the work. Without the audit the team may have guessed memory bounds problems but not where to make improvements.
POP_AR_33	The major impact of the audit lies in the fact that it gave us a lot of information we can directly use to improve the performance of the code. From an organization point of view, any improvement which is directly linked to cost and computing time reduction can lead to direct cost savings.
POP_AR_34	HPC (POP) experts became interesting as far as they could combine various HPC metrics, and not just one or two, in order to analyze the performance of a code
POP_AR_35	The audit gave (the customer's) team good insights into the weak spots of the code. The code developers already started integrating the recommended improvements.
POP_AR_37	Thanks to the audit, we were able to know the parts of the code that needed to be improved which allowed us to list where we have to concentrate our work.
POP_AR_39	The major impact of the audit was that we got the certitude that we were executing the code in an efficient way and the scalability threshold of the code. We now know how it will behave if we try to augment the size of the grid to simulate. It's an important point to know the size of the problem the code can handle.

4. User Forum Meetings organized in Year 2

The initial objective which consisted in organizing a large and unique User Forum each year in a place where we could invite customers from all countries appears unrealistic in hindsight: most end-users are unwilling or don't have the budget to travel to a distant place for participating in such global user forums.

A more realistic solution is the organization of several user forums, combined with a detailed presentation of the POP Project and Services (Dissemination) in different countries in the framework of a conference or workshop in which our end-users are possibly interested and can more easily attend. In other words, it is easier to convene German end-users in Frankfurt, Spanish end-users in Barcelona, and French end-users in Paris.

So, BSC could manage to organize a User Forum in the framework of the HPC Summit Week in Barcelona (15-19 May) and JSC succeeded in applying for organizing a BoF session at ISC'17 (18-22 June 2017) as they did in June 2016.

As reported in POP blog, about 25 participants came to our [POP User Forum](#) on May 19, 2017 during the [EU HPC Summit Week 2017](#) in Barcelona.



After an [introduction](#) to the POP CoE and its services by Coordinator Jesus Labarta of BSC, Sally Bridgwater from NAG summarized the [results and successes from the first 18 months of POP services](#). Next, two selected POP customers presented their experiences and results from performance assessments: Harald Klimach, Universität Siegen, talked about the outcomes of various POP services for his codes [Ateles und Musubi](#) and Riccardo Rossi, UPC, presented results of the [Kratos](#) code analysis. The last three presentations focused on collaborations with other CoEs or organisations:

Paul Gibbon, JSC, reported on the outcome of a series of [EoCoE/POP performance analysis workshops](#), Alan O'Cais, JSC, discussed the [collaboration with the ECAM CoE](#), and finally Ondrej Jakl, VSB, described the [POP training at IT4I and results from the PERMON code analysis](#). The User Forum closed with a [questions and answers session](#) for POP customers and collaborators led by Maïke Gilliot, Ter@tec.

The POP BoF at ISC'17 in Frankfurt was also quite successful: over 20 interested people attended our second POP BoF (Birds-of-Feather) session on June 20, 2017.



First, POP Coordinator Jesus Labarta introduced the POP CoE to the audience in a [short overview](#). Next, Mike Dewar, work package leader "POP Community Development", reported on important [results](#) from the Performance Audit, Performance Plan, and Proof-of-Concept services provided by POP in the first 18 months of the project. The BoF concluded with a presentation by a satisfied POP customer: Alexei Yakovlev from SCM in Amsterdam, discussed the POP services applied to their [ADF and DFTB applications](#).

5. Suggestions to POP management

The analysis of the answers provided by the end-users in the POP questionnaires highlighted some points that could be improved:

- In the previous deliverable, we stated that more explanations in the reports were necessary (mainly regarding figures and graphs).



Significant progress has been achieved in that direction while efforts should continue to make these reports as clear as possible.

- A customer reported in a comment that “Analysis should be made for a larger number of threads / MPI cores. It is not clear whether conclusions drawn from a very small number of cores can be extended to real-world simulations with thousands of cores.”

⇒ **Make user aware of the fact that the performance analysis must be made on a configuration which is similar to the configuration that is used for exploitation.**

Note: This is already partly solved by the updated service questionnaire for the customer which now asks for a detailed description of both production runs and development test case configurations.

- In a broader way, users may be asking for various levels of analysis. It will depend on:
 - Whether the user is a developer or a user of the code
 - If various datasets must be used to check all the parts of the code that need to be covered by the analysis
 - If the codes are currently under heavy development or if it's a production code
 - If the customer is an HPC expert or not

⇒ **The level of detail must be assessed (if not done already) at the beginning of the analysis in order to validate that the content of the report and the analysis will be aligned with these criteria.**

- Another customer comment showed that “More frequent and early exchange on arising questions regarding obstacles found in the code. Some issues could have been resolved easily by an earlier communication.”

⇒ **A closer interaction with the end-user could be a good improvement to the services. This is one of the major issues that need to be addressed in order, for the customer, to be involved all along the performance analysis.**

- Some end users found that the performance analysis was a good opportunity to learn how to use the performance analysis tools. However, a fraction of the customers found them hard to install or to use. Those two feedbacks could be solved with training that could be provided to customers with audited code (some of them explicitly asked for it) in order to allow them to replicate the analyses but also the reports.
- Some customers said that they were not aware of the additional POP services (Performance Plan and Proof-of-Concept).



⇒ **The POP experts should always mention, in the closing meeting they have with the customers, that other POP services exist and can bring additional value to Audits or Performance Plan.**

6. Conclusions

During the second year the number of services performed has greatly increased, and the Customer Advocate managed to solicit the feedback from all end-users by sending systematically the appropriate surveys and by carrying out many interviews.

This feedback was very good and showed that the customers were satisfied with the services provided by POP. More and more often the end-users who benefited from an Audit service choose to go forward with a Performance Plan and/or a Proof-of-Concept service.

The User Meeting Forums were also very useful to spread awareness about the project, to provide information to potential customers about the results of actual services performed and get feedback from end-users that were present during the sessions.

Of course, the collected feedbacks show that there is still some room for improvement. We analysed the remarks and suggestions for improvement we got and passed them to POP Management and to POP experts to help them be even more efficient by providing services that fully answer customers' needs in a cost-effective way. See D3.6 for more detailed discussions about that.



Acronyms and Abbreviations

- AR – Audit Report
- BSC – Barcelona Supercomputing Center
- CA – Consortium Agreement
- CAdv – Customer Advocate
- DoA – Description of Action (Annex 1 of the Grant Agreement)
- EC – European Commission
- GA – General Assembly / Grant Agreement
- HLRS – High Performance Computing Centre (University of Stuttgart)
- HPC – High Performance Computing
- IPR – Intellectual Property Right
- Juelich – Forschungszentrum Juelich GmbH
- KPI – Key Performance Indicator
- MS – Milestones
- PEB – Project Executive Board
- PM – Person month / Project manager
- PoC – Proof-of-Concept
- POP – Performance Optimization and Productivity
- PP – Performance Plan
- RV – Review
- RWTH Aachen – Rheinisch-Westfaelische Technische Hochschule Aachen
- USTUTT (HLRS) – University of Stuttgart
- WP – Work Package
- WPL – Work Package Leader



List of Figures

Figure 1 How responsive have the POP experts been to your questions or concerns about the analysis and the report? **Erreur ! Signet non défini.**

Figure 2 What was the quality of their answers? **Erreur ! Signet non défini.**

Figure 3 Are you going to proceed with a next step (ask for a Performance Plan and/or a Proof-of-Concept)? **Erreur ! Signet non défini.**

Figure 4 Jesus Labarta introducing the POP CoE to the audience during the BoF session at ISC'16 **Erreur ! Signet non défini.**