Summary
A Survey of Adaptive Optimization in Virtual Machines
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1 To be completed before class

What are the problems solved by this paper? (50 words)
This paper gives a detailed review of the advances in adaptive optimization technology. It considers
different classes of dynamic optimization techniques and show how they are useful. They quote exam-
pies both from academic research and industry. They try to show how the researches done in the area
of Virtual Machines (VM) has been useful in the actual industry.

What are the approaches attempted by this paper? (50 words)
First the paper defines some terminology to classify the different techniques. Then it presents a brief
history of dynamic optimizations and virtual machines. Then the different classes of techniques are
described - Selective optimization, feedback directed optimizations, feedback directed code generation.
In each of these categories it details the different techniques that come under that category.

What are the main conclusions of this paper? (50 words)
The main aim of the paper is to review all the work done in adaptive optimization technology. It
shows that different academic research techniques are also very effective when applied to actual systems.
The amount of research happening recently shows that many people now have the infrastructure and
framework built.

2 To be completed after class

Did this paper address an important issue? Explain. (100 words)
The aim of the paper is to review the progress made in the field of adaptive optimization technology.
Recently lot of programs are written in virtual machine based environments, like java and C sharp.
These languages increase the productivity of the programs also they provide secure and portable
environment. But these languages make the job of compiler very difficult. To efficiently optimize the
c ode some kind of runtime optimization framework is required. This paper tries to track the history
of such techniques. They try to classify the techniques and tries to understand the problems solved
under each classification. The paper also tries to understand the future challenges in this field.

Are the proposed approaches valid? Describe its strength and weakness. (100 words)
This paper reviews techniques of dynamic optimization and virtual machines. It basically tries to track
the progress made in this area. To understand this, it propse a classification for these techniques. The
techniques were classified under - selective optimization, feedback directed code generation and feedback
directed other optimization. Also the paper discusses the future challenges in this field. The paper is
able to classify all the current technique under such categories. By this we are able to understand how
the dynamic optimization field has progressed from selective optimization strategies like just in time
compilers to dynamic prefectch insertion using frameworks like dynamo. The paper did not discuss the
recent progress in run-time helper thread generation for prefetching. Also the classification did not
give much importance to how the different techniques are implemented - using hardware support or in software.

**Do the results support the conclusions? Explain. (100 words)**
Since the paper is only a review paper there were no results presented. The paper draws conclusions from the papers reviewed. The papers reviewed indicate that though the technique of adaptive optimization was initially only a niche field, it has become a major field due to the advent of virtual machine based languages like Java. Also the number of papers indicate that a lot of people have frameworks to do dynamic optimization. The paper also conclude that the technique of dynamic optimization is mainly an engineering technique with not much theoretical concepts behind. From the different papers it is clear that this field is going to be of very high importance in the future.

**Describe the potential future works? (100 words)**
The paper reviews in detail the different techniques that have been proposed in the field of adaptive optimizations. Though this clearly shows the importance of the techniques, it is not clear on what is the trend in these techniques. It is not clear if people are using more hardware components or they use a complete software framework. So if we go into more detail on how the different techniques are implemented, we would have an idea on where the field is going towards. Also it would be interesting to see how the techniques are used in embedded processing environments. The paper did not address these adequately.