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INDEX

Sr.No.	Title of The Paper	Page No.
1	PROCESS VIRTUAL MACHINE By Priya G. Dukare	
2	ROLE OF THE INFORMATION AND COMMUNICATION TECNOLOGY SERVICES IN EXPANDING ECONOMIC OPPORTUNITY By Sabiya N. Pathan	

PROCESS VIRTUAL MACHINE

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ABSTRACT

This article will show how both business analysts and developers can benefit from workflow, Business Process Management (BPM), and orchestration. The process virtual machine shows the core essence of workflow engines, and how this can be leveraged in a Java environment. While every self-respecting developer knows the relational model behind databases, such a model is absent for workflow engines. The Process Virtual Machine will provide that missing piece. This article will clearly outline the goal and value of the Process Virtual Machine, and guide you through the most important parts of the Process Virtual Machine and what workflow technology is and when it makes sense in a software project. Many aspects of software development are long-running, graph-based executions. For all of those use cases, the Process Virtual Machine can be leveraged as a base library. By using that library, we can significantly reduce the cost of building process languages. It also makes customization of process languages much more feasible.

This article is in fact the result of collaboration between the leading open source communities, and it will take BPM (Business Process Management), workflow, and orchestration to the next level. Red Hat (with JBoss jBPM) and Bull (with Bonita and Orchestra) have years of experience with very diverse process languages and engines. The Process Virtual Machine combines the best ideas of finite state machines, Petri nets, and other models used for workflow.

EMBEDDABILITY:

Current BPM, workflow, and orchestration systems are built as monolithic engines that don't integrate well with Java software development. And yet, software projects that can be realized with only process technology are rare. In most cases, processes need to be combined with other technologies. For those use cases, it becomes vital that the runtime process engine integrates with Java on various levels: the deployment model (the whole engine as a library), transactions, and persistence in a relational database and user interface. For all of these aspects the workflow engine should fit naturally inside the application. The Process Virtual Machine has proven to provide that kind of embeddability in both the standard and enterprise Java platform.

PLUGGABILITY

The most important pluggability point is the node implementations. The runtime behavior of process constructs is implemented in Java. The Process Virtual Machine will provide an API for implementing node behaviors. If you look at it from that angle, the Process Virtual Machine is a component model for building process constructs.

BASICS

A *process* is a graphical description of an execution flow. For example, the procedure on processing expense notes is a process. It can be deployed in a process engine. One process can have many executions. Figure demonstrates an example process for an insurance claim.

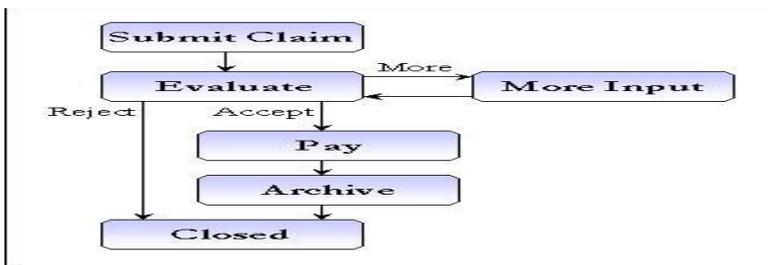


Figure. An example process for an insurance claim

The basic structure of a process is made up of nodes and transitions. Transitions have a sense of direction, and hence a process forms a directed graph. Nodes can also have a set of nested nodes. Figure shows how transitions and nodes can be modeled in a UML class diagram.

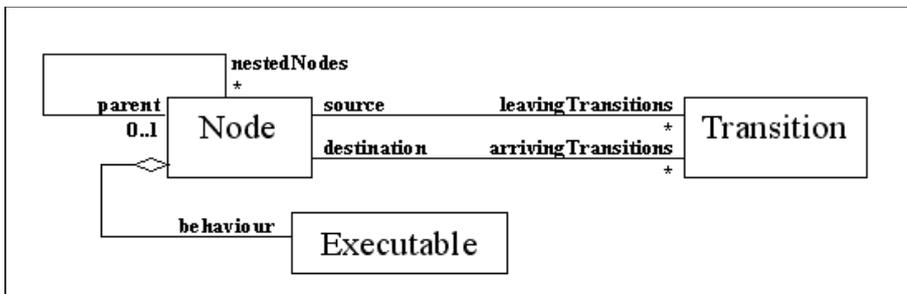


Figure. UML class diagram of nodes, transitions, and their behavior

Each node in the process has a piece of Java code associated as its behavior. Here is the interface to associate Java code with a node.

```

public interface Executable {
    void execute(Execution execution) throws Exception;
}
  
```

An execution is a pointer that keeps track of the current position in the process graph,

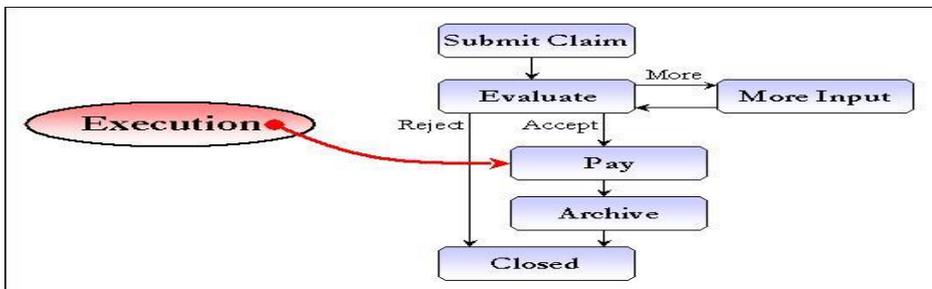


Figure. An execution points to the current position in the process graph

When a new execution is started for a given process, the initial node will be positioned in the initial node of the process. After that, the execution is waiting for an external trigger.

An external trigger can be given with the `proceed` method on the execution. Such an external trigger is very similar to the signal operation in finite state machines. The execution knows how to interpret the process graph. By calling the `proceed` method, the execution will take the specified (or the default) transition, and it arrives in the destination node of the transition. Then, the execution will update its node pointer and invoke the node's behavior.

Traditional workflow engines have a number of flaws that the Process Virtual Machine will resolve:

- *Sole focus on the business analyst.* Traditional workflow systems have a big focus on the graphical tooling. The idea is that a non-tech person can draw a business process.
- *Process engines are monolithic systems.* This creates a lot of complexity for deployment, testing, and coupling workflow transactions with application transactions. The Process Virtual Machine allows workflow engines to be embedded in Java applications or to be deployed in standalone mode.
- *One single, fixed process language.* A process language is in fact a collection of graphical constructs, each with a specific, deterministic runtime behavior.
- *One single environment.* Each process language is typically targeted at one specific environment. Aspects of the environment could be, for example, standard Java, enterprise Java, Enterprise Service Bus (ESB)
- *No easy binding with programming logic.* In practice, it turns out that processes can provide a great backbone for the implementation of real-life business processes.
- *Lack of mindshare.* The workflow market is completely fragmented today, and each engine has its own process language concepts and runtime execution concepts. The Process Virtual Machine is aimed to fill that gap.

CONCURRENT PATHS OF EXECUTION

The Process Virtual Machine describes a whole set of extensions to the basic model, e.g., process variables, actions, process composition, asynchronous continuations, and more. But the most important extension is probably concurrent paths of execution.

THE OTHER HAND SIDE

The workflow engine market is completely fragmented, both in products and standards. Up to now, the search was mostly for the best process language. But there are so many different environments and different features that one process language will never be enough.

In Java land, the Process Virtual Machine approach is unique. But on "the other side," in Microsoft land, the approach in the Windows Workflow Foundation runs very similarly to what is being proposed in the Process Virtual Machine. Both are in fact component models. A process construct is considered a component, and an API and packaging technique are offered to code process constructs as components

Therefore The Process Virtual Machine is a simple but powerful model that has proven to support all kinds of workflow, BPM, and orchestration languages. On top of that, it leads to a pluggable and embeddable design of process engines. Current workflow technologies are focused on the business analyst only. The collaboration between business analysts and developers is largely ignored. The Process Virtual Machine gives more modeling freedom to the business analyst. Additionally, it enables the developer to leverage process technology embedded in a Java application.

CONCLUSION

There are multiple process languages. Each language has its own environment and target use cases. Some languages are general purpose, and other languages might be limited and very specialized.

The Process Virtual Machine is a simple but powerful model that has proven to support all kinds of workflow, BPM, and orchestration languages. On top of that, it leads to a pluggable and embeddable design of process engines.

Current workflow technologies are focused on the business analyst only. The collaboration between business analysts and developers is largely ignored. The Process Virtual Machine gives more modeling freedom to the business analyst. Additionally, it enables the developer to leverage process technology embedded in a Java application.

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ROLE OF THE INFORMATION AND COMMUNICATION TECNOLOGY SERVICES IN EXPANDING ECONOMIC OPPORTUNITY

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ABSTRACT:

Economic opportunity enable people o manage their assets in way that generate income and opportunities. Te past fifty years have witnessed a “revolution “ in global economic growth .yet not everyone has participated in this revolution more than 65%of the world’s poor are severely constrained-and often completely lacking –in opportunity to do betterfor themselves

The business community has both capabilities and the strategic business reasons to ply a major role in creating these opportunity. The economic opportunity series, a product of our economic opportunity program explores these rules across the range of industries for the poor live hood choice in employment and entrepreneurship- are constrained by a wide range of interdependent obstacle from geographic isolation to market failure to political exclusion. It is a combination of factor that enables the poor to manage their assets in a ways that generation income and options. Creating or expanding economic opportunity could rightly be considered a responsibility of governments toward their citizens .But in today’s global market environments, various risk and opportunities provide reason for business to engage.

CONTENT :

The Roles of the information and communication technology sector in the business case for engagement

Expanding economic opportunity

1.1Historical prospective

1.2 fundamental roles of ICT in modern economic growth & development

2.1New & expanding market

2.2 Innovation

Business strategies for expanding economic opportunity

3.1 Creating inclusive business models

4. Future opportunities

INTRODUCTION:

THE ROLES OF THE INFORMATION AND COMMUNICATION TECHNOLOGY SECTOR IN EXPANDING ECONOMIC OPPORTUNITY

The information and communication technology services has been a pioneer and powerful catalyst in Addressing the need and interests of low –income communication in developing countries .But it was not always .Only in the past twenty year or so has self conscious appreciation for the ICT services role expanding economic opportunity emerged.

1. HISTORICAL PROSPECTIVE:

One of the principal reasons is that much has changed in a short time. In technology sector, 20 years are more like five generation. In the 1980s “universal access” was a goal but not the reality of the legacy PPTs an acronym for the firms providing “post telephonic, and telegraph “services Smile if you wish the word and services do sound anachronistic. So are technological and business contexts

The rate of technological innovation in ICT has accelerated dramatically and the sector today is orders of magnitude large than it was 20 years ago and it encompasses a more diverse universe of players than ever before today the sector includes hardware, software the internet, telephony and context application and support services, provided by entities ranging from corporate giants to garage entrepreneurs to individual development and open –sources network. This report while acknowledging the incredible diversity in the nature and size of firm in the ICT service industry will focus on such large firm –whether national, regional, or multinational.

2. FUNDAMENTAL ROLES OF ICT IN MODERN ECONOMIC GROWTH & DEVELOPMENT

Unbound form the strictures of the PTT days ICT has become the foundation of every sector of every economy, everywhere. The reasons for this are, by now, fairly well-known, but demand brief repetition here.

Information and communications technologies:

- Reduce transaction costs and thereby improve productivity.
- Offer immediate connectivity – voice, data, visual- improving efficiency, transparency, and accuracy.
- Substitute for other ,more expensive means of communicating and transacting, such as physical travel
- Increase choice in the marketplace and provide access to otherwise unavailable goods and services
- Widen the geographic scope of potential markets,
- Channel knowledge and information of all kinds

In the developing countries, ICTs offer tremendous potential to eliminate or at least work around a number of critical obstacles to economic growths.

ICTs help to address economic opportunity obstacles-

- Geographic isolation
- Lack of competition and high price of consumers
- Lack of information and low price for producers
- Legal exclusions
- Political voice
- Social capitals

THE BUSINESS CASE FOR ENGAGEMENT

Four billion people worldwide are estimated to earn less than 4a day. Than four billion represent both risk and opportunity for major ICT companies. On the risk side, poverty breeds despair, and people without hope are a threat to stability and progress. This risk affects business generally, and the ICT sector by extension. But the primary motivation for ICT companies to help the poor get richer are opportunity, not risk.

NEW AND EXPQNDING MARKRTS

As described above, ICT increase efficiency, productivity, and access to goods, information, and markets. Demand for these benefits is high. If the right complements – such as power, connectivity, content, skills and support systems, functional markets, and supportive policy frameworks – can be put in place, demand for ICT will be correspondingly high. New and expanding markets are to be found among low income individuals and households and among small and medium-sized enterprises (SMEs).

INNOVATION

Developing and emerging market can also drive innovation There are two main mechanism for this

- Low income customer including individual households & SMEs
- Local ICTs economic develop local equipment manufacturers, software developer.

It helps to growing range of formal 'm-transactions "service

BUSINESS STRATEGIES FOR EXPANDING ECONOMIC OPPORTUNITY

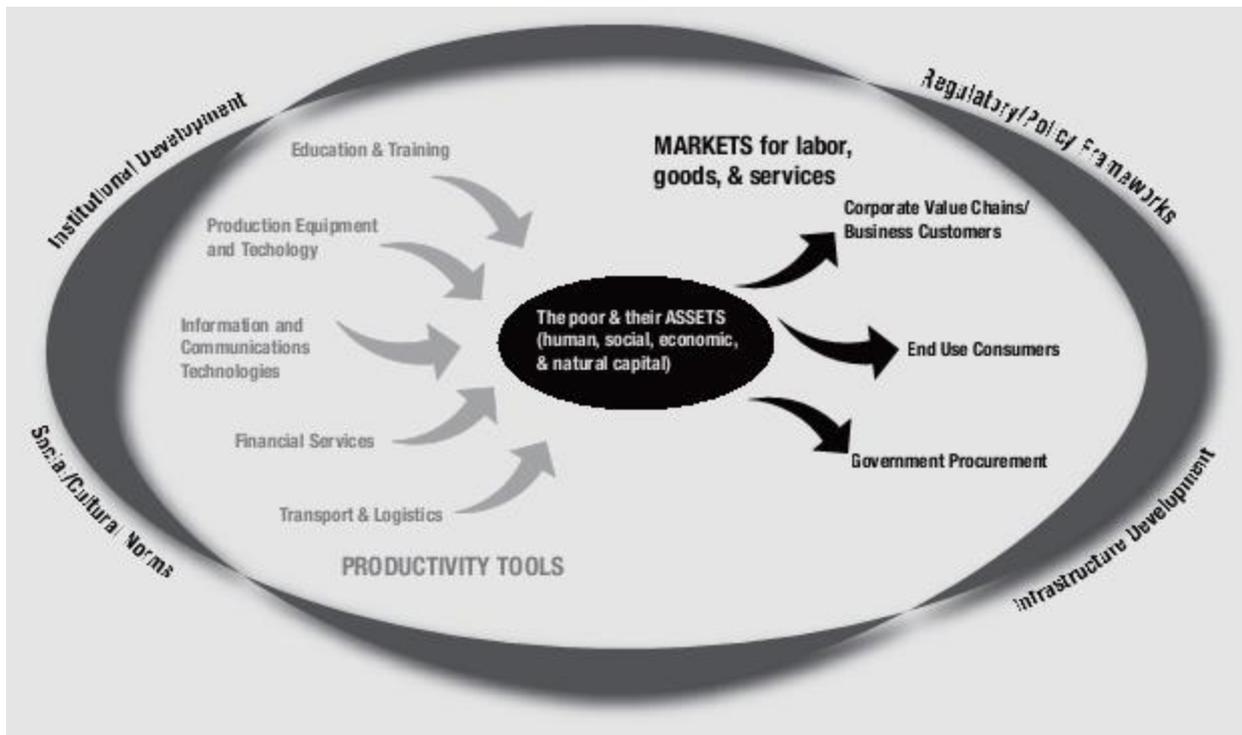
As we have seen information and communication technologies help expand economic opportunity by enabling people to enhance their knowledge and skill. ICTs also enhance capacity in industries and institutions of all kinds

- Creating inclusive Business Models
- Developing Human capital
- Building Institutional capacity

FUTURE OPPORTUNITIES

The economic opportunity explores four key strategies companies can use to expand economic opportunity.

1. Creating inclusive business model: involving the poor employees, suppliers, entrepreneurs, distributors, retailers, customers and sources of innovation in financially viable ways.
2. Developing human capital: improving the education, health, skill and experience of employees and members of the community.
3. Building institutional capacity: strengthening the industry associations, universities, governments, and market intermediaries, organizations of civil societies and grassroots groups who must all be able to play their roles effectively within a system.
4. Helping to optimize the rules of the game- shaping the regulatory and policy frameworks and business norms that help determine how will the economic opportunity system works and the extent to which it is inclusive of the poor.



CONCLUSIONS:

A number of factors distinguish the ICTs in its potential to opportunity Its product and products and service enable individuals, firm governments and other player to expands their economics opportunities as well as creating them for other.

Many firm have already begun to experiment with ways of deliberately leveraging these attributes to expand economic opportunity.

- Continuous standards –setting
Business model innovation
- Leveraging collaborative capabilities

Economic opportunity enables people to manage people to manage their assets in ways that generate incomes and options.

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