Role of Cloud Computing in Digital Signal Processing

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Introduction

Cloud computing is a powerful technology to perform massive-scale and complex computing. It eliminates the need to maintain expensive computing hardware, dedicated space, and software. It assumes that every software application or system component becomes a service or part of a service. Therefore, the architecture of new or existing systems might have to be changed to become cloud compatible.

In these days, technologies like Cloud Computing and Digital Signal Processing (DSP) are becoming increasingly important in gaining and maintaining a competitive edge and developing important relations.

The future will be very bright for the use of DSP in the cloud, both because of the advantages that support this new computing as well as the explosion of digital data that grows each day.

DSP.
Two-dimensional SP && Features

DSP manipulates different types of signals with the intention of filtering, measuring, or compressing and producing analog signals.
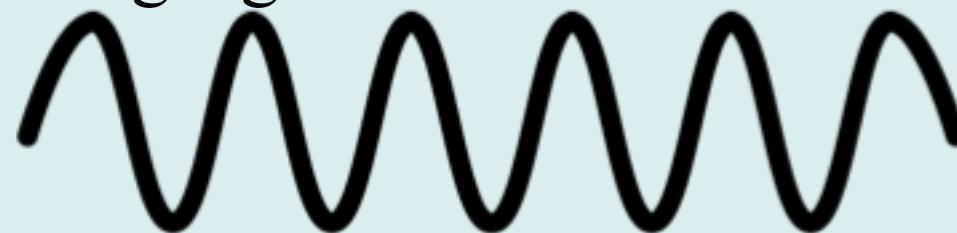
Analog Signal

Digital Signal

The digital signal process takes signals like audio, voice, video, temperature, or pressure that have already been digitized and then manipulates them mathematically. This information can then be represented as discrete time, discrete frequency, or other discrete forms so that the information can be digitally processed. An analog-to-digital converter is needed in the real world to take analog signals (sound, light, pressure, or temperature) and convert them into 0's and 1's for a digital format.

A DSP key components

| Computing Engine:	Data Memory:	Program Memory:	I/O:
• Mathematical manipulations, calculations, and processes by accessing the program, or task, from the Program Memory and the information stored in the Data Memory	• This stores the information to be processed and works hand in hand with program memory	• This stores the programs, or tasks, that the DSP will use to process, compress, or manipulate data	• This can be used for various things, depending on the field DSP is being used for, i.e. external ports, serial ports, timers, and connecting to the outside world.

DSP general system configuration
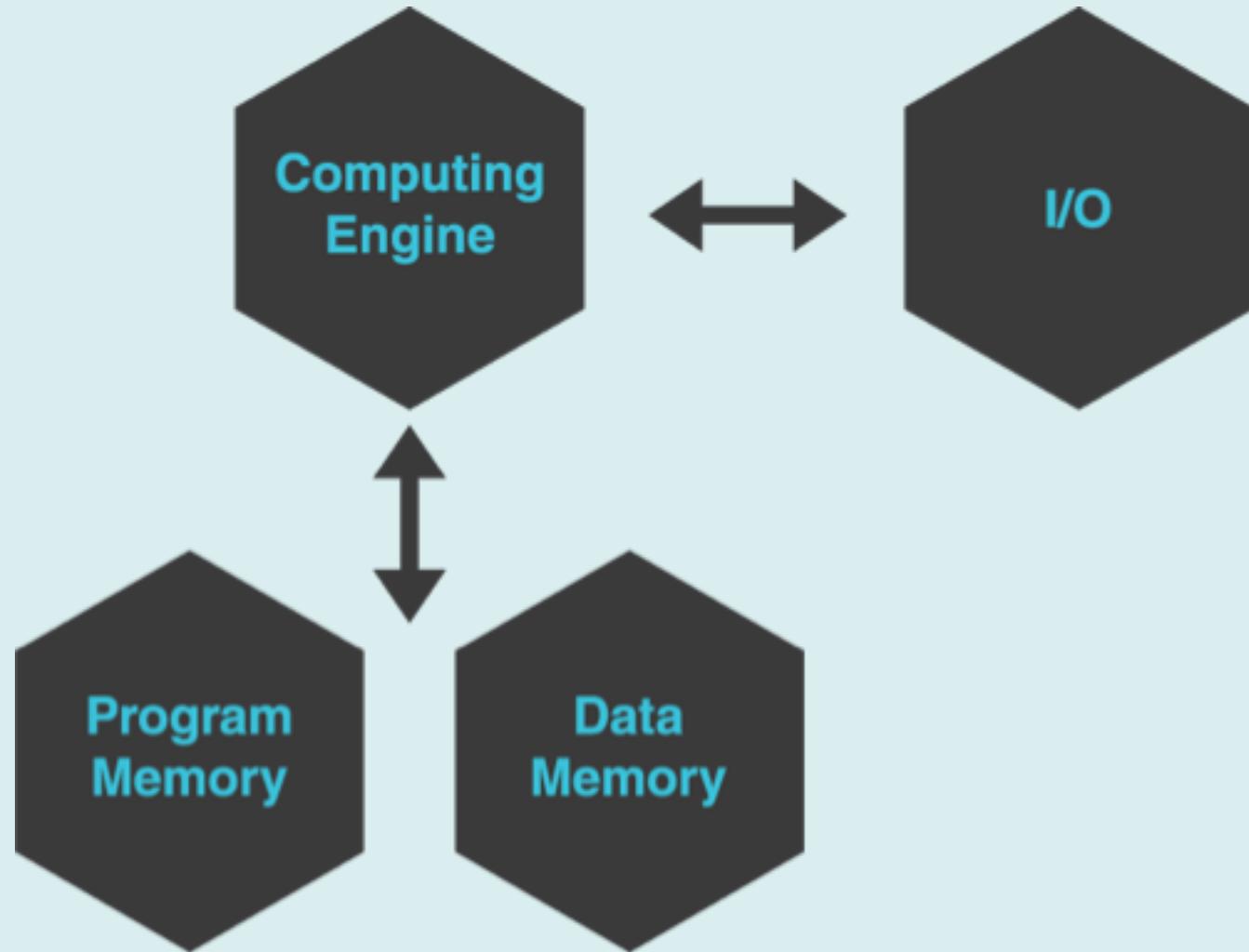
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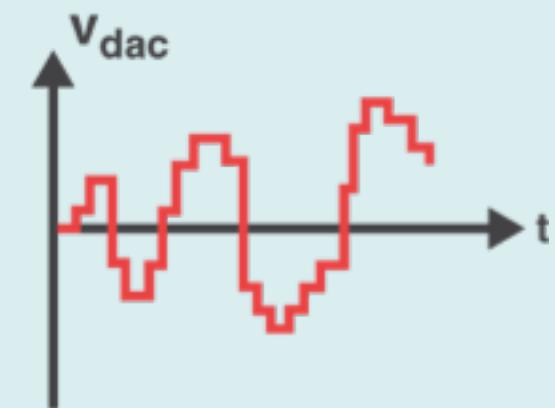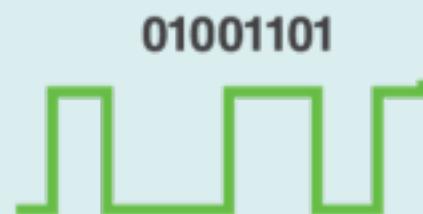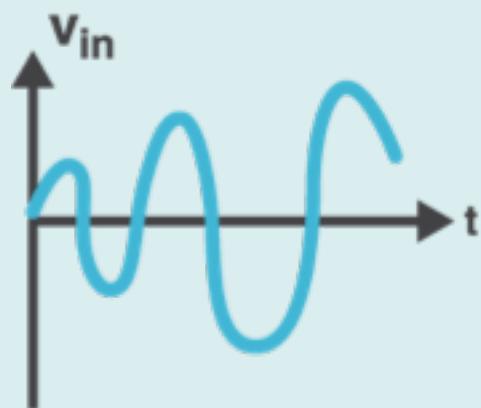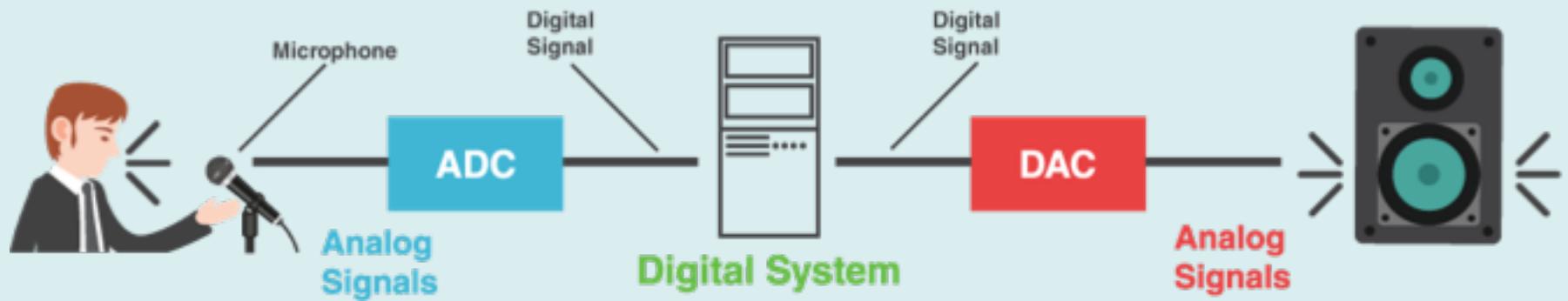
Block diagram of calculating algorithmic factors
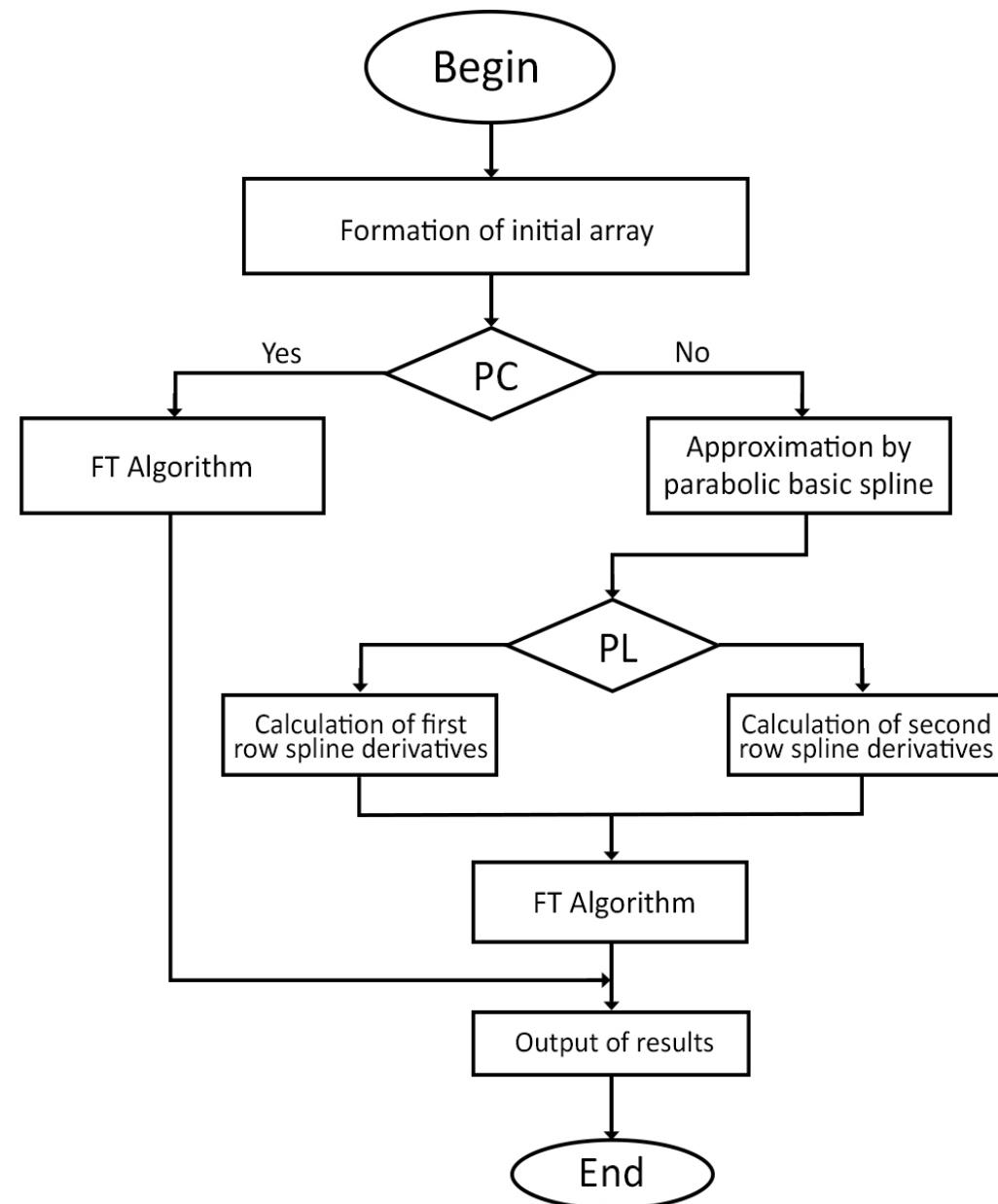
Comparison of bases by quantity of demanded arithmetic operations

No.	Basis's name	Quantity of demanded arithmetic operations N=1024		Operation over complex numbers
		One-dimensional basis	Two-dimensional basis	
1	Basis of harmonics of functions (FFT)	10240	209 715 200	Is present
2	Walsh's basis (FWT)	10240	209 715 200	Is absent
3	Harmut's basis (Harmut FT)	3068	18 874 368	Is absent
4	Haar's basis (Haar FT)	2046	8 388 608	Is absent

CLOUD DSP'S PERFECTLY FUTURE

Cloud DSP represents a way for reporting and analysis solutions to be developed, installed, and consumed more easily due to its lower cost and easier deployment. Ideally, a cloud-based two-dimensional DSP platform makes use of infrastructure-as-a-service (IaaS), complements and extends today's platform-as-a-service (PAAS), utilizes an on-demand, virtualized, elastic software and hardware environment, and delivers application-level functionality as a service (commonly referred to as software-as-a-service)

A cloud-based DSP platform

As time saving, it is internally facing reporting and analysis applications – depending on OS.

As multi-core processors for parallelization, it works with many functions, accelerates workflow and can be applied to different processor with so tasks.

As experimental database, it shows that result gained between all participants depended on the continents can be used widely.

As telemedicine, it can be widely discussed many illness histories among experts and share all experiments, results as well.

THE BENEFITS OF CLOUD COMPUTING FOR DSP

Utilizing SaaS solutions are an effective way to minimize costs and maximize performance. But, there are many noteworthy benefits of Clouding DSP and using a DSP reporting and analytics tool as a SaaS application:

Fast, easy and inexpensive deployment	• Lack of infrastructure set up means a faster Return On Investment (ROI) • Large numbers of simultaneous users
No hardware and setup expenditure:	• Reduced implementation costs equate to a low Total Cost of Ownership (TCO). • SaaS ensures that users only pay for what they use
Flexibility. Improved data sharing capabilities:	• Cloud DSP solutions have the flexibility to be altered quickly to give technical users access to new data analysis and reporting features • Cloud applications enable easy cross-location data sharing and remote data access as they are deployed via the internet
Reliability: Multi-tenancy environment	• Cost and resources can be spread across a large number of users • Free automated software upgrades and maintenance:

THE PROPOSED MODEL

The future will be very bright for the use of DSP in the cloud, both because of the advantages that underpin this new computing paradigm as well as the explosion of digital data that grows each day. Creating knowledge base is one of the best example of DSP in Cloud Computing. Depending on the results which concluded by the experts "DSP in the Cloud" architecture is only going to be feasible when most of user's source data lives in the cloud already

Conclusion

The development of DSP field cannot ignore the cloud computing trends. There are many benefits from using the cloud computing for DSP. It influences the way DSP software projects are managed which it provide a virtually unlimited pool of computing power, storage space and memory for the DSP infrastructure, so our proposed model represents a new environment atmosphere for the DSP that help in reduction of cost for DSP programs, enabling to add environments for testing, proof-of-concepts and upgrades. DSP in the cloud has been developed in order to enhance the efficiency and productivity of DSP sphere and increase the performance of DSP software.

Thank you for your great attention.