New Approaches in Autonomic Intelligence
Deep Autonomic Intelligence and Knowledge driven Enterprise (DAIKDE)

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Contents:

WATSON ++ :
   Is the Autonomic EID Knowledge Manager based on IBM Watson and CDSDE with EID-COS
   written in EIDIL to manage the EID blocks.

Cognitive Dynamic Software Defined Enterprise CDSDE :

Is a new approach of Enterprise computing based on Autonomy and Knowledge, In CDSDE Architecture there
are different types of Tasks and Transaction Management, this approach was proposed by
Abdullah A. Jassim and Saifuldeen A. Abdulameer in the 9th Annual 2017 ECC Conference at Marist College:
https://ecc.marist.edu/documents/745175/860856/JassimCognitive+Dynamic+Software+Defined+Enterprise+CDSDE_31May2017.pdf/14810e6f-3cb5-41c9-aa05-625d9a8c923d

CDSDE Knowledge:
   Cognitive Experience Bank (CEB) and Knowledge Base (KB) is based on Experiences, Information and Data.

CDSDE Management :
   is based on a new type of Operating Systems called EID- Cognitive Operating System (EID-COS).

EID-COS:
   is a Real Time Dynamic Hierarchical Real Time Multi Task Managers and Multi Transaction Managers.

EIDIL:
   is the EID Intermediate Language used by EID-COS to manage the EID Blocks, Tasks and Transactions.

DAIKDE Definitions: DAIKDE, AKE, AKF, KEID Entities

Deep Autonomic Intelligence and Knowledge driven Enterprise (DAIKDE) :

 is a project of building futuristic enterprises based on Autonomic Intelligence and Knowledge, this project has unique paradigms, models, frameworks and environment.

DAIKDE- Autonomic Knowledge Environment (DAIKDE- AKE):

 Is the Futuristic Environment for Interactive and Integrated Autonomic Enterprise, including the Integration and Interaction between Centralized and Decentralized Enterprises Environment and Centralized– Personalized Enterprises Environment. More details in Figure – 1 –

DAIKDE   Autonomic Knowledge Framework (AKF):

 AKF is a new paradigm of frameworks of WATSON++ and DAIKDE-KEID Entities Tasks, Transactions and Operations for expanding multidisciplinary contents, self-learning ,, Self-Organizing, self-Managing, self-assembling and self-maintaining, therefore each KEID Entity will have at least one Task Manager (Hard or Soft Scheduler) and/or Transaction Manager, KEID Entities can establish networks in multi levels. More details in Figure -   -

DAIKDE - Knowledge Experience, Information and Data Entities (KEID Entities):

 KEID entities are Experience, Information and Data (EID) blocks with internal Processing Engine (Task Manager, Transaction Manager and/ or Operation Manager), KEID Entities has a unique Component Model as in Figure -   - , KEID entities are organized hierarchically in assemblies and groups of Entities (KEID Objects, Containers, Spaces and Universe) as in Figure - -.
 KEID Entities can establish Parent /Children Network, participate in Peer to Peer network and participate in higher level networks for self-assembling and self-organizing and other tasks or transaction to achieve the Autonomous KEID Entities.

Definitions : AIDK, AIDKN, AIDEC and DDAK

DAIKDE- Autonomic Intelligence Driven Knowledge (AIDK) :

Is a new approach of depends on the power of **KEID Entities**, therefore AIDK will have new advanced capabilities of Strategic Knowledge and Operational Knowledge, each DAIDEK-Knowledge consists of Knowledge Base, Knowledge Generators and Knowledge Managers, **AIDK** can use and manage KEID Entities massively, e.g. hundreds or thousands of NLPs at the same time to make AIDK capable of self-Reading and self-meaning tasks.

DAIKDE- Autonomic Intelligence driven Knowledge Networks (DAIKDE – AIDKN) :

DAIKDE-AIDKN is not a block, it is the paradigm for flexible networking of DAIKDE including Networks of WATON ++/ CDSDE or KEID Entities including all Knowledge Networks, including the Multi-Directional Feeding Networks, Networks Resources, Layer- Layer Networks, Level-Level Networks, Emergency Networks, Autonomic Emergency Operations Networks (Impact Points and Swift Impact Lines), External Networks.

DAIKDE- Autonomic Intelligence Driven Enterprise Computing (AIDEC):

DAIKDE- AIDEC is a new paradigm to satisfy the requirements of the Disruptive Technologies including Reinforcement Deep Learning, Deep Thinking and Reasoning, Cognitive systems, Augmented/Virtual reality technologies, Software Defined Networks & 5G, Internet of Things and other next generations of Disruptive Technologies.

DAIKDE- Dynamic Deep Autonomic Knowledge (DDAK):

Is a new approach and necessary to satisfy all requirements of Strategies, Policies, Capabilities, Resources and managing all Deep Learning, Thinking and Reasoning systems and all Artificial Intelligence systems in the future.

DAIKDE Design Philosophy

Please note: in this research, we propose Novel ideas, new approaches and new paradigms, and this research is the 2ⁿᵈ research in a series of 8 researches.

Our new approach **Deep Autonomic Intelligence and Knowledge driven Enterprise (DAIKDE),** is suitable for the Futuristic Enterprises based on **DAIKDE-Productive Green Enterprise Model** as shown in figure -1-, **DAIKDE Architecture** is based on the "**Cognitive Dynamic Software Defined Enterprise (CDSDE)**" Enterprise Architecture with additional capabilities based on the new paradigms as follows :

 1- **DAIKDE** has new paradigms as shown in figure -2- DAIKDE Autonomic Knowledge Framework (AKF) and figure -3- DAIKDE – Autonomic Intelligence and Knowledge Integration Model,

A- **Autonomic Intelligence Driven Knowledge (AIDK)**

B- **Autonomic Knowledge Environment (AKE) ,** as shown in figure -2.

2- The above paradigms are very necessary to achieve the **Dynamic Deep Autonomic Knowledge (DDAK)** to satisfy all requirements of Strategies, Policies, Capabilities, Resources and managing all Reinforcement Deep Learning, Thinking and Reasoning systems and all Artificial Intelligence systems in the future

3- **DAIKDE** needs other new paradigm **"Autonomic Intelligence Driven Enterprise Computing (AIDEC)"** to satisfy the requirements of the Disruptive Technologies including Reinforcement Deep Learning, Deep Thinking and Reasoning, Cognitive systems, Augmented/Virtual reality technologies, Software Defined Networks & 5G, Internet of Things and other next generations of Disruptive Technologies, the detailed information in the figures (6, 7, 8).

DAIKDE Design Philosophy : (Continued)

4- Deep Autonomic Intelligence: can be implemented as follows:

A. By putting the processing <u>inside all KEID Entities (KEID Objects, Containers, Spaces and Universe)</u> to make it capable to do all tasks of self-learning and always expands its multidisciplinary contents, Self-Organizing, self-Managing, self-assembling and self-maintaining, therefore each KEID Entity will have at least one Task Manager (Hard or Soft Scheduler) and/or Transaction Manager, KEID Entities can establish networks in multi levels, Each KEID Entity can establish Parent /Children Network, participate in Peer to Peer network and participate in higher level networks, this will give the ability of self-assembling and self-organizing and other tasks or transaction to achieve the Autonomous KEID Entities .

B. **KEID Entity** will be capable to do the tasks and transactions of Reinforcement Deep Learning of Natural Language Processing, Thinking and Reasoning of Modeling for Reading, analyzing, generating models of tasks and operations, assembling it in Experiences with its related Information queries and Data, KEID Entities will internally process all Experience Operations for Information and Data Management.

5-**AIDK** depends on the power of **KEID Entities**, therefore AIDK will have new advanced capabilities of Strategic Knowledge and Operational Knowledge, each DAIDEK-Knowledge consists of Knowledge Base, Knowledge Generators and Knowledge Managers, **AIDK** can use and manage KEID Entities massively, e.g. hundreds or thousands of NLPs at the same time to make AIDK capable of self-Reading and self-meaning tasks.

6-**DAIKDE** have **Autonomic Knowledge Environment** that enables deeply the Autonomic Intelligence in all **Knowledge Experiences, Information and Data (KEID) Entities** starting from the lowest levels (**KEID Objects**) passing through the intermediate levels (**KEID Containers** with **KEID Spaces)** and reaching to the highest levels (**KEID Universe)**, similarly to the Natural Deep Autonomic Intelligence, which is starting from the lowest level (Bio Cell) passing through the Intermediate levels (Tissues and Organs) and finally reaching the highest levels (Human, Family and Society).

DAIKDE World Level Knowledge and Autonomic Intelligence Resources : Quality Management Institutions, Universities & Research Centers , Multi National Corporations, Publishers, etc.			
DAIKDE Country Level Knowledge and Autonomic Intelligence Resources : **May need Human Intervention for Organizing, Building, Operating and Maintaining the** Centers of Excellence and Technical Incubators of Smart Education, Smart Healthcare, e-Government, Smart Cities, Cyber Security and etc.			
DAIKDE Enterprise Levels Knowledge Resources: **Ministries, Universities, Multi nations Corporations or Global Investment**			
DAIKDE Multi Disciplinary Knowledge - Scientific, Engineering & Medicine DAIKDE-MK-SEM		DAIKDE Multidisciplinary Knowledge - Administrative, Legal and Financial DAIKDE-MK-ALF	
DAIKDE-MK-SEM Resources, Experiences and Design	DAIKDE-MK-SEM Operations Management	DAIKDE-MK-ALF Multiparty Contracts	DAIKDE-MK-ALF Multiparty Executive Administration
DAIKDE-MK Solutions Projects and Operations **DAIKDE New Generation of Smart Education, Smart Healthcare, Smart Agriculture, Smart Manufacturing, Smart Energy and Smart Water** * May need Human Intervention for Organizing, Building, Operating and Maintaining the projects and Operations			
DAIKDE – Personalized Services Stations (DAIKDE-PSS) **Education and Learning, Medicine and Healthcare, Manufacturing, Agricultural and Food, Water purification, Energy Power generation, Housing ,Clean Environment and Cyber Security**			
# Natural Resources			

Figure - 1 - DAIKDE   Autonomic Knowledge Environment - AKE

DAIKDE-Knowledge Experience, Information and Data Entities (DAIKDE-KEID Entities):

1. DAIKDE- World Level Knowledge Entities :

      A. DAIKDE- WL-Multiverse KEID Entity is equivalent to World Level (WL) Multidisciplinary Knowledge.

      B. DAIKDE- WL-Multi Spaces KEID Entity is equivalent to Country Level Multidisciplinary Knowledge.

      C. DAIKDE- WL-Multi Container KEID Entity is equivalent to Organization Multidisciplinary Knowledge.

2. DAIKDE-Deep Self-Supervised Cognitive Classifiers (DAIKDE-DSSCC):

    Is responsible about all tasks and transactions of classifying the following KEID Entities:

      A. KEID Objects Entities.

      B. KEID Assemblies Entities.

      C. KEID Containers Entities.

      D. KEID Spaces Entities.

      E. KEID Universe and Multiverse Entities.

Note: more details in the following Figures :

    Figure - 2 – DAIKDE   KEID Entities Object Model   -- Slide No. (11),

    Figure -3- DAIKDE   Hierarchical KEID Entities Model -- Slide No. (12)

    Table -1- : DAIKDE Hierarchical Scaling, Sizing and Inclusion of the KEID Entities -- Slide No. (13)

Entities Layers	Entities Description			
Entity Group(EG) Layer	Entities Group (EG)			
EG Management sub layer	EG Manager including EG Transaction managemnt , EG resources Task management of Assemblies resources and Entities resources		EG Interconnections and Networking with Peer EGs or Higher levels Entities	
EG Actions sub layer	Local Entity Group Tasks		CSER Transactions between EG and and Higer Levels Entities	
EG Resources sub layer	EG - Unified resources			
	Resources of Assemblies related to the Group			
Entity Assembly (EA)Layer	Entities Assembly (EA)			Group Applications EID Resources
EA Management sub layer	Entities Assembly Task and Transaction Manager (EA-TTM)		EA #1 EA #2	
EA Actions sub layer	Local EA Tasks	CSER Transactions between EA and EG	EA #3 : : : EA # M	
EA Resources sub layer	EA unified resources			
	Resources of the Entities related to the EA			
Entity Layer	Entity	Entity #1	Assembly Applications EID Resources	**Abbreviations:**
Entity Management sub layer	Entity TTM	Entity #2 Entity #3 : : Entity #N		1- **EG** is Entities Group
	Entity TM	Management of CSER Between Entity and EA			2- **EA** is Entities Assembly 3- **EID** is Experience, Information and Data.
Entity Actions sub layer	Local Tasks	CSER Transactions		4- **CSER** is Command, Status, Event and Response. 5- **TM** is Task Manager.
Entity Resource sub layer	Applications EID Resources			6- **TTM** is Tasks and Transaction Manager. 7- **RM** is Resource Manager.

Figure - 2 - DAIKDE- KEID Entities Components Model

Figure - 3 - DAIKDE - Hierarchical KEID Entities Model

Slide No. (11)

KEID Entity Scaling, Sizing and Inclusion	Object Entity	Object Entity Assembly	Object Entity Group	Container Entity	Container Entity Assembly	Container Entity Group	Space Entity	Space Entity Assembly	Space Entity Group
Object Entity	1	-	-	-	-	-	-	-	-
Object Entity Assembly	< 1K	1	-	-	-	-	-	-	-
Object Entity Assembly Group	< 1M	< 1K	1	-	-	-	-	-	-
Container Entity	< 1 Giga	< 1M	< 1K	1	-	-	-	-	-
Container Entity Assembly	< 1 Tera	< 1 Giga	< 1M	< 1K	1	-	-	-	-
Containers Entity Group	< 1 Peta	< 1 Tera	< 1 Giga	< 1M	< 1K	1	-	-	-
Space Entity	< 1 Exa	< 1 Peta	< 1 Tera	< 1 Giga	< 1M	< 1K	1	-	-
Space Entity Assembly	< 1 Zetta	< 1 Exa	< 1 Peta	< 1 Tera	< 1 Giga	< 1M	< 1K	1	-
Space Entity Group	< 1 Yotta	< 1 Zetta	< 1 Exa	< 1 Peta	< 1 Tera	< 1 Giga	< 1M	< 1K	1
Universe	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	< 1 Giga	< 1M	< 1K
Multiverse	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited

Table -1- : DAIKDE Hierarchical Scaling, Sizing and Inclusion of the KEID Entities

Figure - 4 - DAIKDE- Autonomic Knowledge Framework (DAIKDE- AKF)

Figure - 5 - DAIKDE- Autonomic Intelligence Driven Knowledge (AIDK)

Slide No. (14)

DAIKDE –KEID Entities and Hierarchical Internal Networking (Local KEID Entities):
KEID Multiverse Entities and Internal Network Level
KEID Universe Entity and Internal Network Level
KEID Space Entity and Internal Network Level
KEID Container Entity and Internal Network Level.

*KEID Objects Entities is the Basic Unit
* KEID Entities is self managed Autonomic and Knowledge Tasks and Transaction Management of its child EID Blocks and other child KEID entities.
* KEID is Knowledge EID , EID is Experiences , Information and Data

DAIKDE Local KEID Entities and WATSON++ EID (Experiences, Information and Data) Blocks and Network connections		DAIKDE Local and Remote KEID Entities and the connections by External DAIKDE-Native External Net.
WATSON++ Networking Integration		DAIKDE- Native KEID External Net Cognitive Management
CDSDE-EIDOS Cognitive Networking Management	Watson Cognitive Networking Management	
CDSDE Networking Services	Watson Networking Services	DAIKDE- Native KEID External Net Services

Experience, Information and Data from Devices and Infrastructure
Text , Visual Data, Geo Spatial Data, Social Data , IoT Devices Data, Status and Commands, Financial Data, Documents Data, Administrative Data, Legal Data, Scientific Data, Engineering Data, Medical Data , Bar Codes, QR codes, Vuforia codes, Voice data , Video data , Brainwave data , Communication Networking and physical layers Data.

Figure – 6 – DAIKDE Autonomic Intelligence Driven Enterprise Computing -AIDEC

DAIKDE- Dynamic Deep Autonomic Knowledge (DDAK)

1. Transaction Ledger (**Dynamic Transactions Active Ledger)** : has the following core services
   The Transaction Ledger KEID Entities is **Dynamic Transactions Active Ledger** which includes and manages the follows:
   A. Container Level Transaction Ledger:
      1) Parent-Children: Transactions between the KEID Container Entity with its all KEID Object Entities.
      2) Peer- Peer: Transactions between the KEID Container Entity with the other KEID Container Entities.
      3) Parent-Grand Parent: Transaction between the Container Entity to the Space Entity.

   B. Space Transaction Ledger for the transactions related to the Space as follows:
      1) Parent-Children: Transactions between the KEID Space Entity with its all KEID Containers Entities.
      2) Peer- Peer: Transactions between the KEID Space Entity with the other KEID Space Entities.
      3) Parent-Grand Parent: Transaction between the Space Entity to the Universe Entity.

   C. Universe Transaction Ledger for the transactions related to the Universe as follows:
      1) Parent-Children: Transactions between the KEID Universe Entity with its all KEID Space Entities.
      2) Peer- Peer: Transactions between the KEID Container Entity with the other KEID Multiverse Entities.

   D. DAIKDE-Inter-Ledgers and Managers (DAIKDE-ILM):
       Is responsible of Managing KEID Entities in different Multi-Levels & Multi-Layers operations including the KEID
       Entities Extraction, Exchanging, Building and Updating

DAIKDE- Dynamic Deep Autonomic Knowledge (DDAK) – Continued

2. DAIKDE- Cognitive Middleware Operations Ledger and Manager : has the following core services:
   A. DAIKDE- High Level Autonomic Operations : including and managing the following:
         1) Self-Organizing
         2) Self Testing
         3) Self-Maintenance
         4) Self-Configuration
         5) Self-Follow UP
         6) Self-Prediction
         7) Self-Timing

   B. DAIKDE Cognitive Active Ledgers System , Consists of the following:
         1) Dynamic Transactions Manager :
            is responsible for Creating, Reading, Writing, Deleting, Activating, Suspending, Resuming, Blocking, Following Up,
            Error detecting, Event Signaling, Relationship Management, detecting, Time signaling and Time following Up.
         2) Dynamic Transactions Active Ledger :
            the transaction between parties are managed depending on the Cognitive Dynamic Relationships, the parties are
            dynamically participated at run time, these advanced transactions need new type of Ledger,

DAIKDE- Dynamic Deep Autonomic Knowledge (DDAK) - Continued

3- DAIKDE- Cognitive Contracts and Transaction Management: The core services are:

   A. DAIKDE-CCM- Knowledge Building :

      This the Strategic & Operational Knowledge Building and Management, it is a special type project for getting the Knowledge from the **International and Local Universities, Organizations and Companies** including the following :

        1) Engineering Sciences

        2) Medical Sciences

        3) Applied Sciences

        4) Artificial Intelligence, Information and Communication.

        5) Administration, Economy and Financial Sciences

        6) Social Sciences

        7) Law

   B. DAIKDE High Level Cognitive Inter-Operations Ledger:

        1) HLC-Decision Making (HLC-DM).

        2) HLC-Operational Knowledge (HLC-OK).

        3) HLC Strategic Knowledge (HLC-SK).

        2) HLC Relationships Operations

        3) HLC Quality Management(HLC-QM)

          A) Key Performance Indicator (HLC-KPI)

          B) Performance Appraisal(HLC-PA).

          C) Quality Assurance (HLC-QA).

DAIKDE- World Level Contracts for Multidisciplinary Knowledge and Autonomic Intelligence (DAIKDE-WLC-MKAI):
Quality Management Institutions, Universities & Research Centers , Multi National Corporations, Publishers, etc.
DAIKDE-WLC-MKAI- Cognitive Ledgers of Transactions and Operations (DAIKDE-WLC-MKAI-CLTO)

Scientific, Engineering & Medical Cognitive Ledgers of Transactions and Operations (DAIKDE-WLC-MKAI –-SEM- CLTO)		Administrative, Legal and Financial Cognitive Ledgers Of KEID Transactions and Operations (DAIKDE-WLC-MKAI—ALF-CLTO)	
DAIKDE-MKAI-SEM-CLTO-PDOT Project Design Operations and Transactions	DAIKDE-MKAI-SEM- CLTO-RTOT Run Time Operations and Transaction	DAIKDE-MKAI-ALF-CLTO-MC Multiparty Contracts	DAIKDE-MKAI-ALF-CLTO-MEA Multiparty Executive Administration

DAIKDE Enterprise Level Cognitive Contracts and Ledgers (DAIKDE- ELCCL)

DAIKDE-MK Solutions Projects and Operations
DAIKDE New Generation of Smart Education, Smart Healthcare, Smart Agriculture, Smart Manufacturing, Smart Energy , Smart Water and Cyber Security
* May need Human Intervention for Organizing, Building, Operating and Maintaining the projects and Operations

DAIKDE-ELCCL-MK-SEM Multidisciplinary Knowledge - Scientific, Engineering & Medicine		DAIKDE-ELCCL-MK-ALF Multidisciplinary Knowledge - Administrative, Legal and Financial	
DAIKDE-ELCCL- MK-SEM-PDOT Project Design Operations and Transactions	DAIKDE-ELCCL-MK-SEM-RTOT Run Time Operations and Transactions	DAIKDE-ELCCL-MK-ALF-MC Multiparty Contracts	DAIKDE-ELCCL-MK-ALF -MEA Multiparty Executive Administration

DAIKDE-PSS-CCL-OT
DAIKDE – Personalized Services Stations -Cognitive Contracts and Ledger for Operations and Transactions
Education, Healthcare, Manufacturing, Agricultural and Food, Water purification, Energy Power generation, Housing and Environment and Cyber security

Figure - 7 - DAIKDE – **Dynamic Deep Autonomic Knowledge (DDAK)**

Thank You