

# A Novel Platform for Higher Education Credit System Based on Block chain

E. Saraswathi, Vivek, Abhrajit Chattopadhyay, Gunda Ravichandra and Sudhanshu Solanki

**Abstract** - The establishments of advanced education need the imbue of another model of instruction so as to keep the educational programs in pace with changing condition which incorporates innovation selection, changing industry prerequisite, changing yearning of understudies and changing desires for society. It is normal that two models and two frameworks of advanced education are Conventional study hall based instruction model and Technology upheld online universal training model which will get significance in this evolving condition. The two advanced education frameworks which are relied upon to be alluring to the students are Choice Based Credit framework and Competency based Credit framework. College Grants Commission has thought of the Choice Based Credit System (CBCS) program in which the understudies have a decision to browse the endorsed courses, which are alluded as center, elective or minor or delicate expertise courses and they can learn at the higher education institution own pace and the whole evaluation is reviewed dependent on a credit framework. Credit framework, in light of the elective framework as units of estimation to compute the measure of learning and adaptability of learning process, is another instructing the board framework well adjusting to the requirements of social and instructive advancement. Block chain advancement engages the creation of decentralized area, where trades and data are not to be under the control of any pariah affiliation. Entire transaction is been recorded in an open record in never- ending way.

**Keywords:** ECTS (European credit transfer and accumulation system), HEI (Higher education institution), block chain, ECTX (European credit transfer exchange).

## I. INTRODUCTION

The instruction business is changing before our eyes. No longer exclusively the area of a concentrated learning condition in either the physical or virtual universes, instruction currently happens by means of shared associations, on the web and from anyplace on the planet.

Instructive suppliers, especially in higher-education, are attempting to outfit advanced innovation as a device for change. Block chain advancements present colossal chances

to help advanced education suppliers: Reduce costs and kill extortion by maintaining a strategic distance from manual confirmation of transcripts and different records. The efficiencies by means of "keen gets" that execute consequently when certain conditions are met. Potential utilizations of block chain in training include: Storage of perpetual records, Learner character confirmation and data security, Student responsibility for learning qualifications, Automatic credit exchanges and Intellectual property insurance for instructive substance. In light of the square chain innovation, we propose a worldwide propelled training credit arrange, named European credit transfer and accumulation system. This stage relies upon the possibility of the European credit transfer and accumulation system. It involves a decentralized propelled instruction credit, and checking on a system that can offer comprehensive headed together point of view for understudies and propelled training foundations (Higher education institution), similarly with respect to other potential accomplices, for instance, associations, establishments, and affiliations. As a proof of thought, we present a model utilization of the earth, in light of the open source ark block chain platform. In perspective on a comprehensive flowed shared framework, European credit transfer and accumulation system will process, supervise, and control ECTS tokens, which address credit that understudies obtained from completing their courses, for instance, European credit transfer and accumulation system. Advanced education foundations are the mates of the block chain form. The stage is a hidden development toward a relentlessly immediate and creatively moved kind of front line guidance structures. The European credit exchange and accumulation framework mastermind tends to the reason of the European credit exchange and accumulation framework development, which envisions that particular Higher training foundation would consolidate to make an all-around skilled, streamlined, and unavoidable condition to stay away from language and managerial obstacles. All things considered, we welcome and want higher training establishment to join the European credit exchange and accumulation framework activity and it block chain engineer.

## II. EXISTING SYSTEM

The vast majority of cutting edge instruction associations (Higher training organization) keep the higher education institution understudies done course records in prohibitive plans. These databases are composed to be just gotten to by a foundation's staff and in submitted online structures, thusly with alongside zero interoperability.

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Also, a large portion of foundations have the higher education institution own one of a kind explicit structure for keeping understudies course records, which prot European credit exchange and gathering framework the restrictive data structure of the database. At the point when all is said in done, these databases are encouraged in a server ranch inside the higher education institution, with restricted access to its IT specialists. Understudies can have outside access to the higher education institution data in a restricted, mystery state guaranteed way, just to view or print the higher education institution completed course records. There are a couple of basic shows in European credit exchange and gathering framework such structures, including organization of data, accumulating zone, prosperity and how to channel, separate and securely offer such data. Related with these issues, higher instruction organization keeps up the understudies' done course records uncertainly. This is required for authentic reasons, dependent upon a country's methodology. Moreover in a large portion of cases, establishments don't share the higher education institution understudies' data, not using any and all means the completed course records. Thus, understudies can experience inconveniences trading to another higher education institution, while up till now sparing and showing the higher education institution climax of courses from the past foundation.

## *Existing System Disadvantages*

1. It is Proprietary Format, A prohibitive setup is a record game plan of an association, affiliation, or individual that contains data that is mentioned and set away as demonstrated by a particular encoding-plot, organized by the association or relationship to be secret, to such a degree, that the interpreting and explanation of this set away data is adequately developed just with explicit programming or gear that the association itself has made. The specific of the data encoding configuration isn't released, or underlies non-disclosure understandings.

2..No ,Interoperability is a typical for a thing or structure, whose interfaces are completely understood, to work with various things or systems, at present or later on, in either utilization or access, without any restrictions

3. One reason for dissatisfaction, a lone motivation behind disillusionment is a bit of a system that, if it misses the mark, will keep the entire structure from working. It is beyond the realm of imagination to expect to exchange to another higher education institution.

The rest of the paper is organized as pursues. The System design, implementation, methodology, algorithms with discussing on challenges and future works.

## **III. PROPOSED METHODOLOGY**

In perspective on the possibility of the European credit transfer and accumulation system we propose an overall block chain-based propelled training credit arrange, named European credit transfer and accumulation system. It is basically a block chain-based decentralized propelled instruction credit platform, named European credit transfer and accumulation system. It develops the spread shared (PtoP) mastermind system. These structures are versatile, secure and solid in perspective on the higher education institution storing cutoff and resource sharing on an overall

scale. The European credit transfer and accumulation system organize trades the propelled instruction credit and surveying structure from the basic and physical world into an extensively compelling, unraveled, all inclusive adjustment, in perspective on the block chain advancement. The European credit transfer and accumulation system arrange is the reason of our European credit transfer and accumulation system movement, which envisions a bound together, streamlined and all around unavoidable propelled training credit and assessing framework. Proposed System Advantages are security, anonymity, longevity, integrity, transparency, immutability.

## **IV.MODULES**

- A. *Generating Blocks for Institution and Students*
- B. *Generate Blocks for Courses and Others*
- C. *Create Block chain and Publish*
- D. *Generate Reports*

### **A. Generate Blocks for Institution & Students**

A square can't be changed subsequent to being made; it turns into the towards the end in the chain. In this module we make squares Institution and Students. Generally, any understudies or establishments, regardless of whether they are not an individual from the system, can see the squares, check the higher education institution substance, and track course subtleties.

### *Student registration*

Exactly when an understudy tries the higher education institution (individual from the European credit transfer and accumulation system block chain sort out), it issues an understudy ID and makes another block chain address for the understudy, containing an open and private key. Additionally, the higher education institution makes another two to two multi signature block chain address with its open key and as of late created understudy's open key. This multi signature address in blend with understudy ID is secured in the higher education institution's database. The higher education institution trades 0.1 European credit transfer exchange token to the understudy's two to two multi signature block chain address and over a private channel gives the understudy the information required for the block chain multi signature wallet setup. The information gave joins

- (1) Rules to set up an European credit transfer and accumulation system block chain wallet,
- (2) The understudy's block chain is address containing open and private keys,
- (3) The higher education institution open key and
- (4) The recoup content.

With the got information the understudy set ups his block chain wallet and a lone area using general society and private keys got from the higher education institution association. He/she also sets up a two to two multi signature block chain address using his/her open key and higher education institution's open key.

The wallet data should be safely secured. Using his/her two to two multi signature wallet, the understudy makes and signs a trade of European credit transfer exchange token to the higher education institution's block chain address. A brief timeframe later, the higher education institution signs the trade using its private key. The trade is dealt with through the block chain compose. Right when the trade is confirmed, the higher education institution stores the information in its database.

### **B. Generate Blocks for Courses & Others**

Each square contains information through coding that is sorted out in an ordered way. In this module we create obstructs for courses and other information's.

#### **Student course completion**

After understudy steps through an examination, the instructor needs to affirm the results. He/she appropriates the test outcomes. In case the understudy has been productive and if the teacher can independently enroll fulfillment of understudy's course responsibilities, by then the results are secured in the fused database. For the most part the instructor prompts the association office to play out the framework expected to enroll the status of the understudy's responsibilities. The results can be at the same time secured in the focused database if the higher education institution needs to keep a parallel system adjusted by national law rules and besides as a support until the European credit transfer and accumulation system block chain structure does not substantiate itself as totally completed und running. The educator or the association office find the understudy's square chain address in the central database, finds the proportion of European credit transfer and accumulation system the course has set and uses the block chain wallet to trade the best possible proportion of European credit transfer exchange tokens to the understudy's two to two multi signature block chain address. The trade is dealt with through the block chain compose. Right when the trade is certified, the teacher or association office records the productive European credit transfer exchange tokens move into the central database.

After an understudy steps through an exam, the instructor needs to affirm the results. He/she disperses the test outcomes. If the understudy has been viable and if the instructor can independently enlist finish of understudy's course responsibilities, by then the results are secured in the united database. For the most part the instructor illuminates the association office to play out the approach expected to enroll the status of the understudy's duties. The results can be in the meantime secured in the joined database in case the advanced education establishment needs to keep a parallel structure formed by national law rules and moreover as a fortification until the European credit exchange and accumulation system block chain system does not substantiate itself as totally completed und running. The educator or the organization office finds the understudy's block chain address in the central database, finds the proportion of European credit exchange and collection framework the course has set and uses the block chain wallet to trade the correct proportion of European credit exchange trade tokens to the understudy's two to two multi signature block chain addresses. The trade is set up through the block

chain mastermind. Exactly when the trade is avowed, the educator or association office records the productive European credit exchange trade tokens move into the central database.

### **C. Create Block chain & Publish**

Block chain is a grouping of squares containing a type of information. In this module we make the block chain from the recently made module. In block chain innovation, information is gathered in squares, and squares are associated with one another, framing a chain. This depicts why the innovation is called block chain. It is a computerized record for the proposed advanced education credit stage that holds data of exchanges occurring over the web.

#### **Verification of student credit record**

Exactly when a relationship (for instance chief, school, etc.) requirements to affirm the understudy's course duty completing, the understudy needs to send his block chain address, his/her two to two multi signature block chain area and recover substance to the verifier - affiliation. The affiliation checks for the recover substance to affirm an understudy's area and two to two multi signature area. Using the block chain web API to get to block chain data, the affiliation checks the proportion of European credit transfer exchange tokens in the two to two multi signature area, which addresses the understudy's educational credit achievements. A brief span later, by methods for a private channel, the affiliation requires that the understudy signs a message with his area in order to check his/her character. Exactly when the understudy, using the block chain web application, signs the message with his/her area and private key, he educates the affiliation, who checks the stamped message. If the checked message is affirmed, the affiliation can trust that the showed block chain address and its acts tokens regard are no ifs and they are under study.

### **D. Generate reports**

In this module we generate various reports like

- Institution List
- Students List
- Courses by Institution
- Students By Institutions
- Students By Courses
- Student Credit Report
- And many more

## **V. ALGORITHM**

Prior to setting off to the current framework there are a few innovations, calculations and diverse kinds of block chains to examine. A Block chain can be suggested as disseminated database that continuously stores a chain of data squeezed into fixed squares in an ensured and suffering way. The chain of squares, furthermore called a record, is distinctly creating, thusly new squares are being joined past what many would consider possible of the record, whereby each new square holds a reference (altogether more effectively a hash regard) to the substance of the past square.



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The substance of the squares can be predefined or negligently made by the customers of the block chain. Everything considered, the data is managed into demonstrated trades as shown by the predefined structure of the block chain and cryptographically fixed. The open key encryption instrument is used to ensure the security, and along these lines consistency, irreversibility and non-reputability of the circled record content.

There are three essential sorts of block chains:

- Open-permission less,
- Private-permissioned, and
- Consortium blocks chains.

The open-permission less are block chain type underscores the open part, along these lines all block chain data is accessible and evident to the complete system. Regardless, a few bits of the block chain could be mixed in order to spare a segment's nonappearance of definition. Additionally, in these open block chain types anyone one can join the structure as a framework center. Occasions of such a block chain are the Bit coin and the Ethereum block chains. In reverse, a private block chain enables just picked center concentrations to join the structure; everything considered being seen as a sort of a gushed yet in the interim focused framework.

### A. Conveyed consensus

Since block chain is an appropriated record such as database that lies on a person to person sort out, every companion of the framework holds a replication of the confirmed record state and a pool of unverified data which ought to be squeezed into squares and added to the record. All together for the block chain framework to remain utilitarian, the companions need to agree on a particular state of the record content and on a course to squeeze data into squares. This is come to by a dispersed understanding tradition, which supports the consecutive solicitation of data made . The scattered accord tradition ensures that a dominant part of block chain sort out companions agree on the precise state of the normal record, in like manner the solicitation in which new squares are added to the record . A bit of the used scattered accord computations are affirmation of work (PofW), check of stake (PofS), delegated proof of stake (DPofS), affirmation of centrality, affirmation of development, confirmation of devour, affirmation of store, etc. . Next we present in detail PoW and PoS, the most ordinarily used approaches to manage accomplish an agreement in a block chain.

### B. Block chain network node

In order to have a totally utilitarian block chain arrange, a ton of framework centers is required, which are thusly the establishment of the block chain. Since the block chain sort out is fairly P2P orchestrate, a center can be seen as a partner when it starts to interface and talk with various centers in the framework, and thusly the best possible name would be a companion center. For solace, we will from this time forward show it as a center point. Truth be told talking, a block chain center is any PC that has the middle block chain client presented and works a full copy of the block chain record.

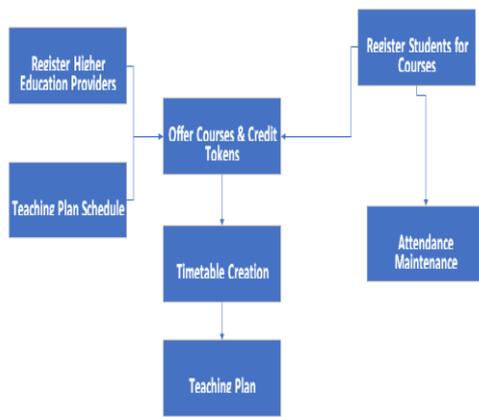
Exactly when the customers of a specific block chain attract with the block chain, they truly interface with the framework through a center point. The supposed

mineworkers of the PoW thought are a subset of centers, since all diggers ought to in like manner work a totally down to earth center, along these lines each excavator is a center point, anyway just a single out of each odd center is moreover an excavator. This the truth is moreover clear with respect to other block chain variations where other scattered accord types are exhibited and no mining is required, for instance PoS .thusly, we can express that centers choose the dispersed accord, in like manner surrendering to a specific rule and that the block chain goes about as an understanding instrument to ensure that the center points stay in a condition of amicability .Also, in PofW type block chain, an essential center does not get any reward as an excavator does, along these lines the fundamental favorable position for running a center is to help guaranteeing the framework. The basic assignments of a block chain center point are:

- partner with the block chain mastermind,
- covering up away ground breaking record,
- checking out trades,
- passing on real trades into the framework,
- Tuning in for as of late fixed squares, favoring as of late fixed squares certifying trades, and making and passing on new square.

### C. Multi signature protocol

A multi signature tradition is a prominent thought in the open key cryptography world. It engages different get-togethers to together cautiously sign an agreed message, each with the higher education institution very own private key. Such an option is appealing in circumstances when distinctive social occasions need to reliably agree, as because of joint budgetary parity. Such a money related parity is for example an International Bank Account Number ,(which by virtue of a moving toward trade, does not require any action from the record holders and considerably more, it covers the identities of the record holders. In spite of what may be normal, when a functioning trade must be coordinated, each record holder needs to give the higher education institution underwriting before the trade being taken care of by the bank. Such a thought is starting at now a run of the mill practice in the advanced cash world, whereby M to N block chain are wallets that can be made. Where M shows the base number of required endorsers of a trade and N implies the full number of possible areas (account holders). A point of reference would be a two to three multi signature area, which contains three social occasions (the higher education institution open keys), and no under two of those need to sign a trade from this multi signature address in order to be readied. In the computerized money world, using such a technique in order to coordinate trades is implied as pay-to-content hash (PtoSH), rather than the common pay-to-open key-hash (PtoPKH) trades, which support non-multi signature addresses.



**Fig: - Flow Diagram**

In addition, using his block chain address, the understudy as the recipient of European credit exchange trade tokens, will no doubt all around exhibit his/her completed courses, with no administrative, substance or language hindrances by simply presenting his/her block chain addresses For security, understudies will be designated a two to two multi signature area by the higher training institution home advanced education foundation, consequently they won't in all probability trade any of the grabbed European credit exchange trade tokens to various. The route toward dispensing understudies with European credit exchange trade tokens and higher instruction institution ability to exhibit the responsibility for will be dealt with through a simple to use European credit exchange and accumulation system block chain API client, consequently making the use of the European credit exchange and accumulation framework organize as normal as would be reasonable.

Any approve advanced education organization and higher instruction institution people will very likely join the framework. While joining the framework the advanced education organization should set-up a framework center point (see the fragment Block chain orchestrate center) in order to keep up an overall establishment and a secured framework. A totally down to earth center point imparts messages over the framework, which is the underlying stage in the trade system that results in a square certification, as needs be insistence of European credit transfer exchange credits trades for completed courses to understudies. The advanced education establishment center point will in like manner have the center European credit exchange and accumulation system block chain client on its server case with the replication of the complete block chain record. This adds to the security, since the more center points there are, the more secure the framework .The advanced education establishment and as such center points, won't have to mine trades, since the European credit exchange and accumulation system block chain stage will be established on DPoS accord tradition (see the territory Distributed understanding). Thusly no enrolling power is required by the advanced education foundation center point. Such a technique is also legitimate from the security plot for the European credit exchange and accumulation framework organize, since discretionary partners can't join the framework and make new European credit exchange trade tokens by mining them .As such, the European credit exchange and accumulation system block

chain and be viewed as a consortium adjustment of a block chain (see the territory Block chain - Distributed Ledger Technology). Each new advanced education organization that joins the framework and is researched by other part higher instruction foundation will be doled out with European credit exchange trade tokens and mentioned to set up a framework center. Since we propose a DPoS appropriated understanding type of the block chain, each advanced education foundation part will in all likelihood register as a specialist in the European credit exchange and accumulation system block chain organize and the European credit exchange and accumulation framework advanced education establishment social order will cast a ballot for a delegate which in this way will assert trades and seal squares. This recommends the system will cast a ballot for that advanced education establishment which will be the most authentic and steady in its work. In order to ensure a permissioned adjustment of the block chain organize, and a law based and non-advantage arrange, we mean to cut down the assembling prize to zero.

In the going with subsections we delineate in detail the four basic circumstances, which will occur in the European credit exchange and accumulation framework. Each circumstance is supported up by a Business Process Management (BPM) diagrammatic depiction.

## VI. IMPLEMENTATION

This section follows the proposed stage European credit exchange and accumulation framework, a block chain-based propelled instruction credit and assessing stage. The European credit exchange and accumulation system block chain organize is envisioned for getting ready, directing and controlling European credit transfer exchange tokens as insightful credits and laying on an inside and out spread P2P mastermind, where mates of the block chain sort out are higher education institution and customers of the stage are understudies and relationship (for instance associations as potential bosses).The European credit transfer exchange tokens address an indistinguishable incredibly regard for completed courses ,similarly as with the European credit exchange and amassing framework credits European understudies gain (see region European Credit Transfer and Accumulation System). Each understudy will hold a committed European credit exchange and accumulation system block chain wallet, where he will accumulate European credit transfer exchange tokens, for instance the estimation of credits doled out by the higher education institution for his/her completed courses. Each time an understudy completes a course, his home higher education institution will trade the reasonable number of European credit transfer exchange tokens to his/her block chain address. The trade information is secured on the block chain, where the going with data is secured:

The sender is known by their related higher education institution with its official name.

The recipient - understudy is furtively presented, token course credit is regarded.

## VII. RESULTS

The going with zone outlines the more broad setting, assumptions, and perceives the obstacles and challenges of the given block chain organize. Along with the displayed affirmation of thought and the model execution of the European credit exchange and accumulation framework organize, we have in like manner introduced the European credit exchange and accumulation framework movement, and predict that the system around it will turn out to be further. All the recognized accomplices (for instance Higher training establishment , understudies, associations) can benefit by a comprehensive believed, decentralized propelled instruction credit and investigating system, which is definitely not hard to use and is free from any legitimate, substance and language obstructions, hence introducing reasonable automatic lucidity for an exceedingly visit process, which is spread all through the world.

It should be seen that the European credit exchange and accumulation framework movement's arrangement isn't to thoroughly change and change the present credit and assessing systems set up in various countries, yet to energize it by including straightforwardness and motorization in order to progress administrative strategies related to the propelled training structure on an overall scale. This is considerably more a case pondering distinctive regulatory rules in different countries and contemplating diverse credit and assessing systems on an overall scale. Frankly, as a result of authentic reasons (national or transnational order and benchmarks) the combination of the two systems at indisputably the beginning stage is an astoundingly likely circumstance. Along these lines, we encourage Higher training establishment to join the European credit exchange and accumulation framework action and use the European credit exchange and accumulation framework organize in the meantime with higher instruction institution present method the load up, while also contributing with new considerations, comments and recommendations concerning the European credit exchange and accumulation framework arrange. The straightforwardness of both the stage and the thought in like manner enables the progress and further improvement of the thought in imaginative increments or positive acclimations to the thought.

There are a few preferences for different stakeholders using a phase, for instance, European credit exchange and accumulation framework. Basically, the European credit exchange and accumulation framework organize engages relationship as possible future organizations the probability of checking academic records of potential laborers direct. Advanced education organization get an open, decentralized and clear strategy for supporting records for understudies and higher training institution duties. The proposed stage supports the higher instruction establishment in higher training institution practices related to understudies and gives the probability of distortion ID and repugnance. Along these lines, the prerequisite for a continuously astounding checking process as for an understudy's educational records can be avoided. Moreover, the understudies are offered the probability of straightforwardness and a survey of higher instruction institution academic duties inside the degree of higher training institution examination programs. An

understudy can immediately check his/her completed course records. An unquestionable ideal position for all the included accomplices is in like manner the probability of a survey trail. Along these lines distortion can be maintained a strategic distance from.

## VIII. CONCLUSION AND ITS FUTURE SCOPE

European credit exchange and accumulation framework was proposed as an overall block chain-based propelled training credit arrange. The proposed stage takes the upside of the block chain in order to make an extensively accepted propelled training credit and looking into system. We presented a model utilization of the European credit exchange and accumulation framework arrange which relies upon the open-source ark block chain organize as a proof. The proposed European credit exchange and accumulation framework organize keeps an eye on an all-around headed together point of view for understudies and affiliations. Understudies benefit by a singular and clear point of view on higher training institution completed courses, while Higher training organization approach up-to date data paying little personality to an understudy's educational causes. Diverse beneficiaries of the proposed system are potential chiefs, who can clearly endorse the information given by understudies.

Later on, we plan to test the model in a real-life space, which would consolidate Higher training establishment, understudies and associations. Along these lines the showed thought could be moreover affirmed. Moreover, we mean to modify the European credit exchange and accumulation system block chain so each course would be distributed with a unique block chain address with pool of tokens. Subsequent to finishing the course obligations, students must get tokens from the course address and not directly from the foundation. The course address could be a multi signature address which is between an establishment and an educator. Starting at now, the proposed stage relies upon the Europe an credit exchange and aggregation framework looking into system, anyway could be possibly extended and acclimated to any present credit or affirmation structure and along these lines combine distinctive pieces of informative accreditation. We in further course of action to extend our work and the European credit exchange and accumulation framework stage to be stab lashed on splendid contracts and an appropriate adjustment of the block chain development.

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